Grant Allen

Flashlights on Nature

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FLASHLIGHTS ON NATURE

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DON’T let my title startle you; it was Linnæus himself who first invented it. Everybody knows the common little “green-flies” or “plant-lice” that cluster thick on the shoots of roses; and most people know that these troublesome small insects (from the human point of view) are the true source of that shining sweet juice, rather slimy and clammy, that covers so many leaves in warm summer weather, and is commonly called honey-dew. A good many people have heard, too, that ants use the tiny green creatures in place of cows, coaxing them with their feelers so as to make them yield up the sweet and nutritious juice which is the ants’ substitute for butter at breakfast. But comparatively few are aware how strange and eventful is the brief life-history of these insignificant little beasts which we destroy by the thousand in our flower-gardens or conservatories with a sprinkle of tobacco-water. To the world at large, the aphides, as we call them, are mere nameless nuisances—pests that infest our choicest plants; to the eye of the naturalist, they are a marvellous and deeply interesting group of animals, with one of the oddest pedigrees, one of the queerest biographies, known to science.

I propose, therefore, in this paper briefly to recount their story from the cradle to the grave; or, rather, to be literally accurate, from the time when they first emerge from the egg to the moment when they are eaten alive (with some

hundreds of their kind) by one or other of their watchful enemies. In this task I shall be aided not a little by the clever and vivid dramatic sketches of the Aphides at Home, which have been prepared for me by my able and watchful collaborator, Mr. Frederick Enock, an enthusiastic and observant naturalist, who thinks nothing of sitting up all night, if so he may catch a beetle’s egg at the moment of hatching; and who will keep his eye to the microscope for twelve hours at a stretch, relieved only by occasional light refreshment in the shape of a sandwich, if so he may intercept some rare chrysalis at its moment of bursting, or behold some special grub spin the silken cocoon within whose case it is to develop into the perfect winged insect.

NO. I.—A BRANCH OF THE FAMILY TREE.

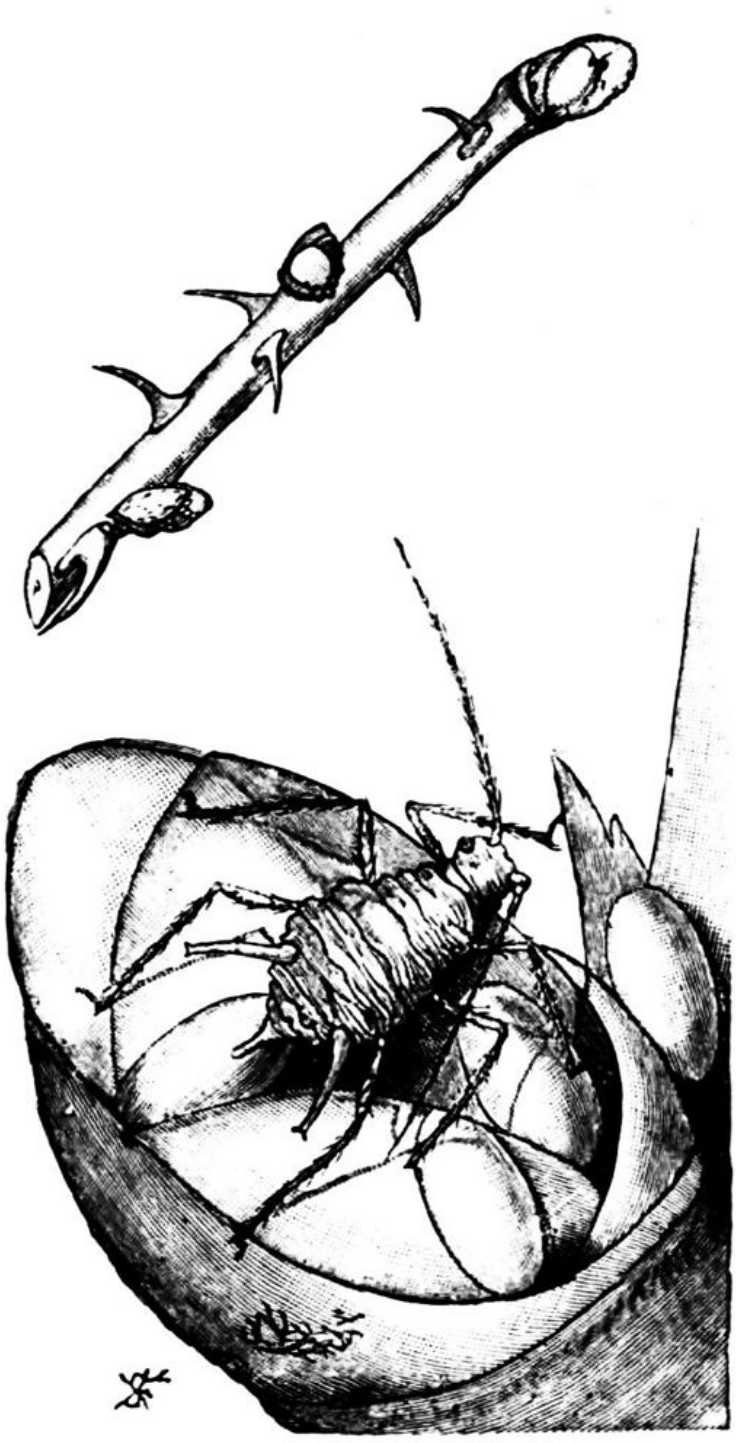
Rose-aphides, or “green-flies,” as most people call them, are, to the casual eye, a mere mass of living “blight”—a

confused group of tiny translucent insects, moored by their beaks or sucking-tubes to the shoots of the plant on which they have been born, and which they seldom quit unless forcibly ejected. For they are no Columbuses. The spray of rose-bush figured in sketch No. 1 shows a small part of one such numerous household in quiet possession of its family tree, and engaged, as is its wont, in sucking for dear life at the juices of its own peculiar food-plant. You will observe that they are clustered closest at the growing-point. Each little beast of this complex family is coloured protectively green, so as to be as inconspicuous as possible to the keen eyes of its numerous enemies; and each sticks to its chosen twig with beak and sucker as long as there is anything left to drink in it, only moving away on its six sprawling legs when its native spot has been drained dry of all nutriment.

We often talk metaphorically of vegetating: the aphis vegetates. Indeed, aphides are as sluggish in their habits and manners as it is possible for a living and locomotive animal to be: they do not actually fasten for life to one point, like oysters or barnacles; but they are born on a soft shoot of some particular plant; they stick their sucking-tube into it as soon as they emerge; they anchor themselves on the spot for an indefinite period; and they only move on to a new “claim” when sheer want of food or *force majeure* compels them. The winged members are an exception: *they* are founders of new colonies, and are now on their way to some undiscovered Tasmania.

And, indeed, as we shall see, these stick-in-the-mud creatures have yet, in the lump, a most eventful history—a history fraught with strange loves, with hairbreadth

escapes, with remorseless foes, with almost incredible episodes. They have enemies enough to satisfy Mr. Rider Haggard or the British schoolboy. If you look at No. 2, you will see the first stage in the Seven Ages of a rose-aphis family. The cycle of their life begins in autumn, with the annual laying of the winter eggs; these eggs are carefully deposited on the leaf-buds of some rose-bush, by a perfect wingless female, at the first approach of the cold weather. I say a perfect wingless female, because, as I shall explain hereafter, most aphides (and especially all the summer crops or generations that appear with such miraculous rapidity on our roses and fruit-trees) are poor fatherless creatures; waifs and strays, budded out vegetatively like the shoots of a plant.



NO. 2.—WORN-OUT MOTHER—
LAYING HER LAST EGG.

About this strange retrogressive mode of reproduction, however, I shall have more to tell you in due time by-and-by; for the present, we will confine ourselves to the immediate history of the autumn brood, which is regularly produced in the legitimate fashion, as the result of an ordinary insect marriage between perfectly developed males and females. As October approaches, a special generation of such perfect males and females is produced by the unwedded summer green-flies; and the females of this brood, specially told off for the purpose, lay the winter eggs, which are destined to carry on the life of the species across the colder months, when no fresh shoots for food and drink are to be found in the frozen fields or gardens.

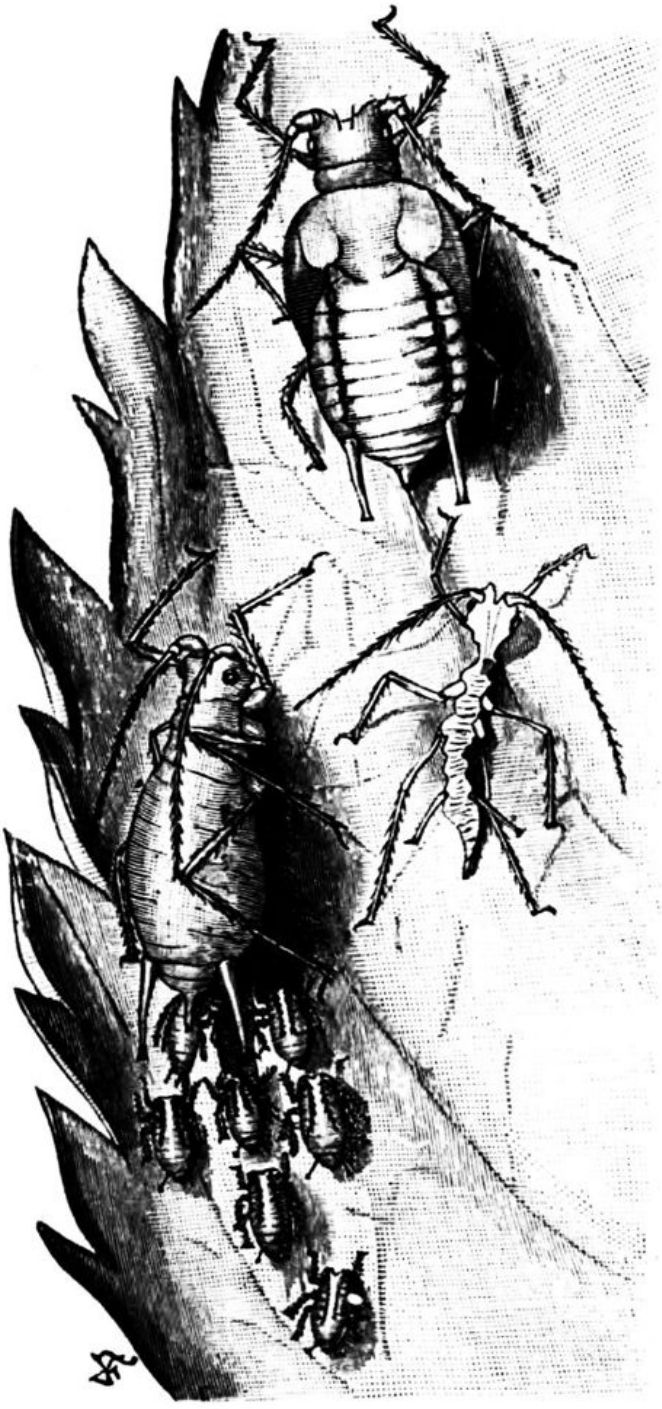
The eggs, so to speak, must be regarded as a kind of deferred brood, to bridge over the chilly time when living aphides cannot obtain a livelihood in the open. In No. 2 we see, above, a rose-twig with its leaf-buds, which are undeveloped leaves, inclosed in warm coverings, and similarly intended to bridge over the winter on behalf of the rose-bush. On this twig, then, we have the winter eggs of the aphis, mere dots represented in their natural size; they are providently laid on the bud, which in early spring will grow out into a shoot, and thus supply food at once for the young green-flies as they hatch and develop. So beautifully does Nature in her wisdom take care that blight in due season shall never be wanting to our Marshal Niels and our Gloires de Dijon!

In the same sketch, too, we have, below, a pathetic illustration, greatly magnified, of the poor old worn-out mother, a martyr to maternity, laying her last egg in the

crannies of the bud she has chosen. I say “a martyr to maternity” in solemn earnest. You will observe that she is a shrivelled and haggard specimen of over-burdened motherhood. The duties of her station have clearly been too much for her. The reason is that she literally uses herself up in the production of offspring; which is not surprising, if you consider the relative size of egg and egg-layer. When this model mother began to lay, I can assure you she was fat and well-favoured, as attractive a young green-fly as you would be likely to come across in a day’s march on the surface of a rose-twig. But once she sets to work, she lays big eggs with a will (big, that is to say, compared with her own size), till she has used up all her soft internal material; and when she has finished, she dies—or, rather, she ceases to be; for there is nothing left of her but a dried and shrivelled skin.

During the winter, indeed—in cold climates at least—the race of aphides dies out altogether for the time being, or only protracts an artificial existence in the heated air of green-houses and drawing-rooms. The species is represented at such dormant periods by the fertilised eggs alone, which lie snug among the folds or scales of the buds till March or April comes back again to wake them. Then, with the first genial weather, the eggs hatch out, and a joyous new brood of aphides emerges. And here comes in one of the greatest wonders; for these summer broods do not consist, like their parents in autumn, of males and females, but of imperfect mothers—all mothers alike, all brotherless sisters, and all budding out young as fast as they can go, without the trouble and expense of a father.

They put forth their progeny as a tree puts forth leaves, by mere division. The new broods thus produced are budded out tail first, as shown in No. 3, so that all the members of the family stand with their heads in the same direction, the mother moving on as her offspring increases; and since each new aphis instantly begins to fix its proboscis into the soft leaf-tissue, and in turn to bud out other broods of its own, you need not wonder that your favourite roses are so quickly covered with a close layer of blight in genial weather.

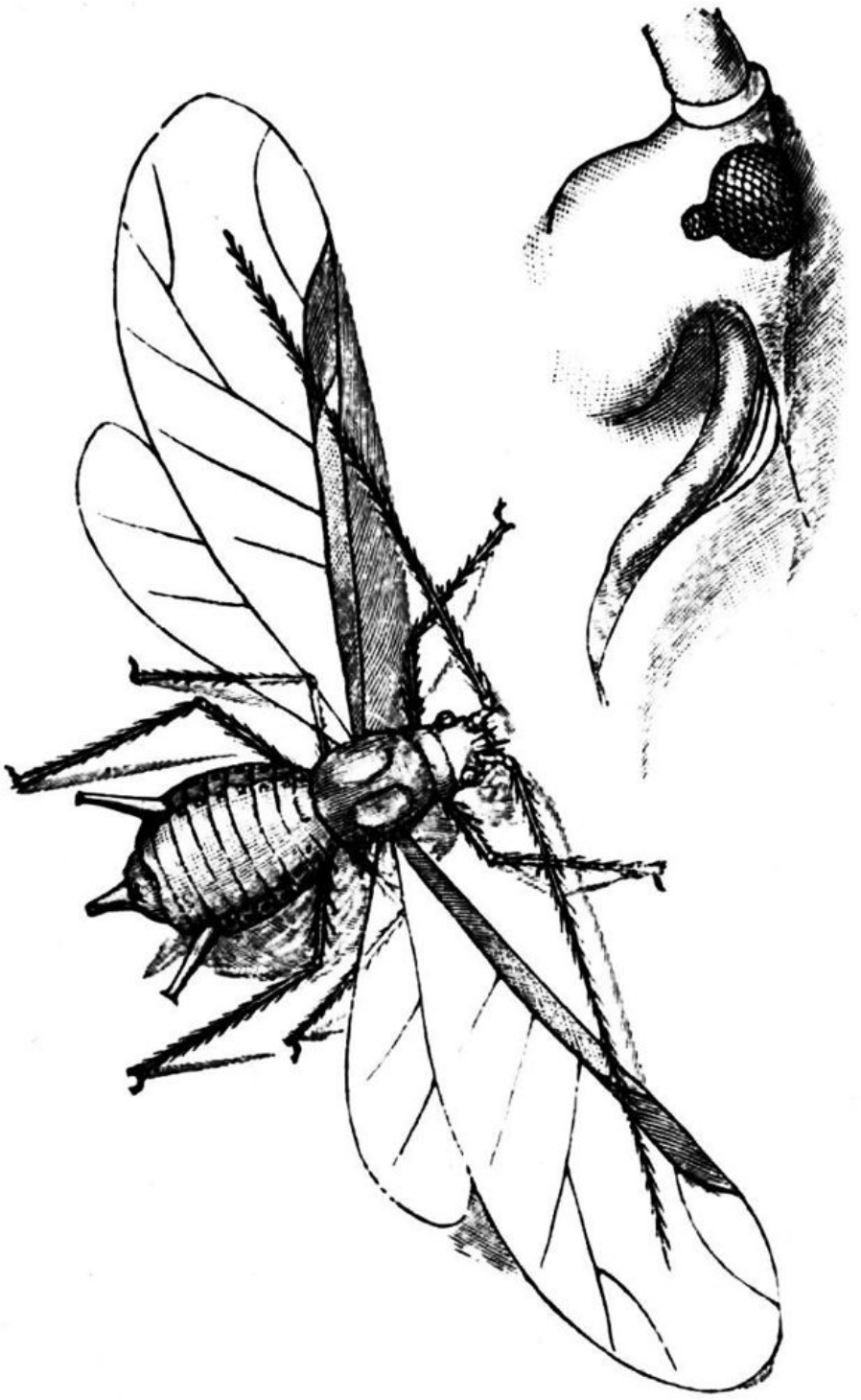


NO. 3.—BUDDING MOTHER—PRODUCING A FATHERLESS BROOD.

To say the truth, the rate of increase in aphides is so incredibly rapid, that one dare hardly mention it without seeming to exaggerate. A single industrious little green-fly, which devotes itself with a quiet mind to eating and reproduction, may easily within its own lifetime become the ancestor of some billions of great-grandchildren. It is not difficult to see why this should be so. The original parent buds out little ones from its own substance at a prodigious rate; and each of these juniors, reaching maturity at a bound, begins at once to bud out others in turn, so that as long as food and fine weather remain the population increases in an almost unthinkable ratio. Of course, it is the extreme abundance of food and the ease of living that result in this extraordinary rate of fertility; the race has no Malthus to keep it in check—each aphis need only plunge its beak into the rose-shoots or leaves and suck; it can get enough food without the slightest trouble to maintain itself and a numerous progeny. It does not move about recklessly, or use up material in any excessive intellectual effort; all it eats goes at once to the production of more and more aphides in rapid succession.

Many things, however, conspire to show that aphides did not always lead so slothful a life: they are creatures with a past, the unworthy descendants of higher insects, which have degenerated to this level through the excessive abundance of their food, and through their adoption of what is practically a parasitic habit. When life is too easy, men and insects invariably degenerate: struggle is good for us. One of these little indications of a higher past Mr. Enock has given us in the upper part of sketch No. 3. For some

members of the brood go through regular stages of grub and chrysalis, like any other flies; or, if you wish to be accurately scientific, pass through the usual forms of larva and pupa, before they reach the full adult condition. This, of course, shows them to be the descendants of higher insects which underwent the common metamorphosis of their kind. But most of the budded out, fatherless broods in summer are produced ready-made, without the necessity for passing through larval or infantile stages. Or rather, they never grow up: they merely moult; and they produce more young while they are still larvæ. They are born fully formed, and proceed forthwith to moor themselves, to feed, and to bud out fresh generations, without sensible interval. In No. 3 we have various stages in the development of the spring brood. Above we see the pupa, or chrysalis, produced from a grub (not very grub-like in shape), which has sprung from an egg; and on the right, below, we see the shrivelled larval skin from which it has just freed itself. This particular aphis was thus born as a six-legged larva from an autumn egg; it passes through the intermediate form of a pupa, or chrysalis; and it will finally develop into a winged “viviparous” female, such as you see in No. 4 below, putting out its young alive as fast as ever its wee body can bud them. You may observe, however, that in the case of aphides there is no great difference of form between the three successive stages. Larva, pupa, and fly are almost identical.



NO. 4.—WINGED FEMALE—THE FOUNDRESS OF A COLONY.

In No. 4, again, we have a portrait from life of such a *winged* female, the mother of a numerous fatherless progeny; for both winged and wingless forms are produced through the summer. She is round and well-fed, as becomes a matron. Observe in particular the curious pair of tubes on the last few rings of her back; these are the organs for secreting nectar or *honey-dew*, a point about which I shall have a good deal more to say presently. A winged female like this may fly away to another rose-bush to become the foundress of a distant colony. The same illustration also shows, in a greatly enlarged form, her beak or sucking apparatus, which consists of four sharp lance-like siphons, enclosed in a protective sheath or proboscis, and admirably adapted both for piercing the rose-twig and for draining the juices of your choicest crimson ramblers. The aphis sticks in the point as if it were a needle, and then sucks away vigorously at the rose-tree’s life-blood. You can watch her so any day with a common small magnifier, and see how, like the lady at Mr. Stiggins’ tea meeting, she “swells wisibly” in the process. Indeed, aphides are always beautiful objects for the microscope or pocket lens, with their pale, transparent green bodies, their bright black eyes, their jointed hairy legs, their delicate feelers, and their marvellous honey-tubes; and it will not be my fault if you still continue to regard them as nothing more than the “nasty blight” that destroys your roses.

NO. 5.—UNNATURAL LODGER EATS HIS HOSTESS OUT OF HER SKIN.

Do not for a moment suppose, however, that you and your gardener, with his spray and his tobacco-water, are the only enemies the rose-aphis possesses. The name of her foes is legion. She is devoured alive, from without and from within, by a ceaseless horde of aggressive belligerents. The most destructive of these enemies are no doubt the lady-birds, which, both in their larval and their winged forms, live almost entirely on various kinds of green-fly. This practical fact in natural history is well known to hop-growers, for the dreaded “fly” on hops is an aphis; its abundance or otherwise governs the hop market, and Kentish farmers are keenly aware that a certain particular lady-bird eats the “fly” by millions, on which account they protect and foster the lady-bird, thus leaving the two insects, the parasite and the carnivore, to fight it out in their own way between them.

But No. 5 introduces us to a still more insidious though less dangerous foe: an internal parasite which lays its eggs inside the body of the bud-producing female. There the grub hatches out, and proceeds to eat up its unwilling hostess, alive, *from within*. In the sketch, we have an illustration, below, of an aphis which has thus been compelled to take in a stranger to board and lodge in her stomach; while the top figure shows how the lodger, after eating his hostess out, eats himself out into the open air through her empty skin. If you look out closely for such haunted green-flies, inhabited by a parasite—most often an ichneumon fly—you will find them in abundance on the twigs of rose-bushes. They have a peculiar swollen, quiescent look, and a brownish colour.

No. 6 shows us another such fierce enemy at work. This formidable insect tiger is the larva of the wasp-fly; he is a

savage carnivore, who moors himself by his tail end, stretches out to his full length, and swoops down upon his unsuspecting prey from above; and being blessed with a good appetite, he can get rid of no fewer than 120 aphides in an hour. As he probably eats all day, with little intermission for rest and digestion, this gives a grand total of about 1500 or 1600 victims at a sitting. However, the remaining aphides go on budding away as fast as ever to make up the deficiency, so the loss to the race is by no means irreparable. "*Il n'y a pas d'homme nécessaire*," Napoleon used to say; and the principle is even more true as applied to the green-flies. If a few millions die, their place is soon filled again.