"IT TURNED TO INFLAMMATION."

BY A FAMILY DOCTOR.

"IS it inflamed? Is there inflammation?" It is the object of this paper to give definite meaning, in as popular language as possible, to these terms. They are words much misunderstood, and misapplied. The subject is difficult to explain, but throws a bright light on the whole field of disease. It is especially interesting in these days of microbes and germs; and now most of all, when the world is thrown into a fever heat of excitement by the recent discoveries of Koch.

Perhaps the reader may be deterred by mention of the mysterious word "germs." He or she may say, "I do not wish to be enticed into that everlasting maze. I am tired of that already." It is no maze, reader. If you sow a seed, it grows. That is familiar enough. If you sow a germ (which is only, as it were, a kind of seed), it will grow. That is all. Germs are pernicious weeds which will grow in a great variety of soils. But a germ is a weed which has the appalling tendency to select the human body as the soil in which it delights to flourish, at the expense, and often to the destruction, of that body. Thus germs, which are really fungi, become the most interesting plants known to man.

What, then, is inflammation? Let us quote the definition of Professor Burdon Sanderson. "Inflammation is the succession of changes which occur in a living tissue when it is injured, provided that the injury is of such a degree as not at once to destroy its structure and vitality." What does this mean? It means that every little prick, cut, scratch, is attended by inflammation in the part of the body so injured. Yet that inflammation may run through its whole course without the patient being aware of it. No matter is formed. The ordinary surgical signs of inflammation may not be discernible to him. What are these signs? They are four: heat, pain, redness, and swelling. Yet there is inflammation, true and complete, though we, perhaps, cannot see it. There has been an injury, and there have been the inevitable results of the injury. It may get quite well without showing any visible signs. But inflammation does not always terminate in this happy way. It does not always resolve itself, and allow the healing process to begin. It may progress to the formation of matter, accompanied by further destruction of the part, or even to ulceration, leaving a visible breach in the skin. Again, if the original cause of the injury is severer, or more prolonged in action, the result may be mortification, or death of a larger part of the body; or even general blood-poisoning and death of the sufferer. These, then, are the possible results of an injury, however, apparently, trifling at first. These are what are described in surgical books as the "terminations of inflammation." Are they inevitable in certain cases, or have we any control over them? Well, in the first place, an injury of a certain intensity, acting for a given time, will produce a certain given degree of inflammation. We shall see that, in wounds of our own making, we can prevent the introduction of irritating material; in wounds the result of accident, we can control the offending cause. In fact, if we understand inflammation properly, what it is, and what influences it, we can keep it in check, and limit the severity of its results.

Let us study the process of inflammation a little more in detail, and chiefly with reference to some particularly simple case, such as a cut finger. When we watch the process, as we can for instance in the web of a frog's foot, under the microscope, the chief changes take place in the blood-vessels and blood. Now the blood-vessels are so universal that no injury can take place without affecting them directly or indirectly. Every part of our body is dependent for its nourishment, nay, its life, on the blood. The blood consists of a fluid in which are floating two kinds of solid bodies, blood-cells. These are the red cells, on which the colour of the blood depends, and the white cells. The white cells (which play a very important part in inflammation and its results) are independent living bodies which can move about on their own account. In fact, bodies very similar to them are found leading a free and independent existence in pools and ditches. The blood is carried to any part of our bodies by small tubes called arteries. When it has done its business in that part, it is carried away, altered in its nature, by the veins. Arteries and veins are called blood-vessels. The essential feature in an inflammation is that the vessel-wall is damaged, and the blood leaves the vessels. We do not mean that the blood necessarily pours out of the cut end of the vessel like water out of a cut pipe, though of course it may do so. There is a damage short of this, which causes the vessel-wall to act more like a filter than a pipe with a big hole in it. Like a filter, too, it sorts out the different parts of the blood, allowing some parts to come out of the vessel more quickly than others. The first change, we see, is a dilation of the vessels; for the injury has so damaged the muscles in their walls, that these have lost their power of contracting. The next effect of the damage of the vessel-walls is that they lose their power of retaining the blood, which begins to leave the vessels for the parts around. Meanwhile, the blood-current has become slower and slower in the damaged vessels till at last it stops. While this is being brought about, the blood-cells, which at the beginning of the process occupied the middle of the blood-stream, gradually make their way to the sides of that stream, and to the vessel-walls. As these walls have previously been so altered by the injury that they can no longer hold the blood, the blood filters through into the parts

around the vessel. These parts are now seen choked with blood-cells, especially white ones, and are softened and damaged by the presence of the blood, which they were never intended to receive. The whole part in which these changes, the result of injury, are taking place, is said to be inflamed, or to be in a state of inflammation. If the process is intense enough, and the part sufficiently near the surface, the usual accompaniments of inflammation are manifest; redness, swelling, heat, and pain. The redness is due to the exudation of the blood from the vessels, and to the dilation of the vessels, just as occurs temporarily in blushing. The swelling is due to excess of blood and exudation. The heat is due to the excess of blood charged with oxygen, and to the active chemical changes going on in the part. The pain is due to the dragging on the nerves by the displaced material, and to the pressure on them of the exudation.

The picture is now complete. Given an injury, you must have its results inevitably. The inevitable results are those above described. The name given to them is inflammation. The severity of the inflammation is exactly proportional to the severity of the injury, and to the time during which it acts. So much for the original injury.

But (now this is still more important) the inflammation is also proportional to causes which come into action after the original injury. These generally are preventible, as we shall see later.

What now is the next event? Either (from the intensity and prolongation of the cause of the damage) the inflammation, already complete in itself, may progress to further destruction; or (from the cause having been withdrawn) the inflammation resolves, and healing takes place. Should resolution take place, and healing commence, some of the cells return to the vessels, some die and break up and are carried away. Clots break up and are absorbed. The vessel-walls recover, and things in time return to their original state. If the injury is a simple cut finger, the blood between the edges of the cut clots, and white blood-cells migrate in large quantities into the clot. New blood-vessels are formed from the old. Finally the clot is absorbed, and replaced ultimately by a scar. Such, then, is the process of repair. This starts when the inflammation, which is a destructive process, has ceased.

If, on the other hand, the destructive process does not cease in the manner described above, but goes a step further, matter is formed; and the destruction is not only much greater, but the healing process is different, and much less favourable. The white cells, instead of being broken up and absorbed, or helping in the process of repair, go to form matter. The matter burrows in the flesh, destroying in its path both by its contact, and by the pressure it exerts where it is pent up. In the blood-vessels clots form, which block them up, and prevent the blood from circulating, thus adding starvation to the ills of the injured part. Such, then, are the phenomena of inflammation, when due to a cause acting for a long time, a continued irritation. Such a state of things may be prevented, if we know the offending cause, and remove it, such as a thorn or piece of glass. But it is frequently found that wounds which should heal kindly, do not do so, but tend to fester, and form matter. The inflammation, instead of resolving and giving way to the healing process, tends to go on to the formation of matter.

The reason of this evil and preventible alternative has only been thoroughly investigated and settled of comparatively recent years, and is still a mystery to the laity. The cause of an inflammation tending to form matter is, in most cases, the introduction of germs into the wound. At any rate, in any wound, if germs have been admitted, there will be a struggle between the resisting power of the healthy body to unwholesome influences on the one hand, and the germ on the other, fighting for its very existence. Whence do these germs come? The whole air is full of them; the dust is full of them; every stick, stone, knife, or other thing capable or incapable of inflicting a wound is covered with them. Our very skin is covered with them. When we say "covered with them," we must be taken to mean that they occur abundantly. Hence, hardly any wound which can be made can escape without germs being introduced into it, unless special precautions are taken. Such being the case, germs will practically of necessity occur in wounds. It is the duty of the surgeon, when he himself makes a wound, to prevent the entrance of germs; or, when a wound is brought to him, to destroy any germs that are already there, and prevent any more from entering. This is the principle of antiseptic surgery, which has revolutionised surgery, and constituted Sir Joseph Lister one of the greatest benefactors of the human race.

How, then, do germs act? Germs are minute living fungi. When they fall into any material, which is suitable for their nourishment, such as broth, milk, or the discharges from wounds, they grow and multiply with astonishing rapidity, taking in the food and casting out refuse from their bodies just as animals do. Thus the broth, or discharge from the wound, or whatever the material may be they have taken up their abode in, becomes changed in its nature, and is said to putrefy, or to undergo putrefaction. Discharges from wounds which have thus undergone putrefaction develop qualities which are extremely unfavourable to healing. They become highly irritating to the wound. They tend to make the inflammation prolonged, and cause it to go on to the formation of matter. They cause great swelling by their increased quantity, and pain from the same cause. The growth of the germs themselves is a source of great heat, just as in the analogous process of fermentation, which is itself dependent on germs. In fact, the presence and growth of germs in a wound is a sure guarantee for all the signs of acute inflammation, with all its destructive accompaniments; and until they have ceased their activity healing must give way to destruction.

Now as there are great varieties of plants, so there are great varieties of fungi. There are likewise great varieties of germs, having diverse effects on the wounds into which they are introduced. Some merely affect the wound itself, causing the formation of matter and local destruction of the part. Others, again, which

may be introduced in a similar manner into the body, through the wound, have the power of infecting the whole mass of the blood, causing blood-poisoning, and even death. Such a disease as erysipelas, for instance, is due to the introduction of a particular kind of germ. Germs are not necessarily introduced into the body by means of a wound. They may be introduced by the lungs, stomach, or bowels, when we breathe, or eat, or drink. Indeed, they are always present in the blood. The healthy blood while circulating, however, has the power of killing them, and getting rid of them, if they are not introduced in too large numbers. But sometimes they come across a damaged spot, and then they multiply, and give rise, for instance, to a boil or abscess, where there has been no breach of the skin. Thus it is easy for us to understand how such diseases as small-pox, scarlatina, and consumption are caught. But now want of space compels us to leave one of the most far-reaching and interesting studies in the whole of medicine.

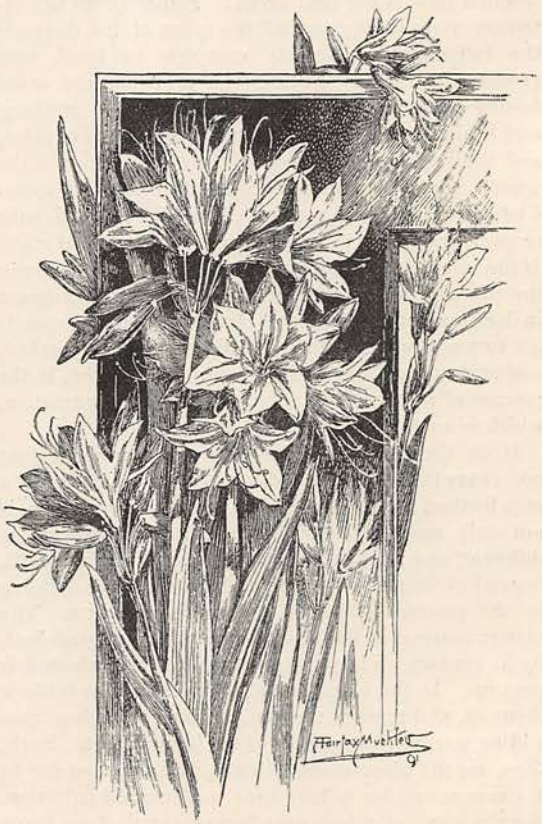
THE GARDEN IN APRIL.

AURICULA.

NOW that the month of April has once again set in, we have every reason to congratulate ourselves that the dreary and terrible winter of 1890–91 is a thing of the past. Many an old and hardy favourite that has for years, perhaps, held its own in our flower-garden and shrubbery, must doubtless since November last have succumbed in exposed situations to the rigours of our late Arctic season. The lesson, then, that we have to learn from our misfortunes in this variable climate is that we should always have in readiness some sort of adequate protection to give to any exposed flower, tree, or shrub, in every department of the garden.

Out of a natural desire, then, to feast our eyes upon some vivid contrast to the darkness of winter, let us select some gay and brilliant flower to discuss before we see what general observations have to be made relative to our gardening routine for the month. And what a brilliant contrast, for example, does the Amaryllis present to all the fog and gloom that we have experienced. Of this noble flower there are of course hardy half-hardy, and still more tender ones ; but one and all of them are most beautiful and will amply repay any trouble that we bestow upon them. And belonging to the same tribe or natural order of the Amaryllidaceæ, are the Hippeastrum and the Habranthus, but their exact classification has often been a matter of dispute. Now the bulb of the Amaryllis should be planted at a good depth, though not more, perhaps, than six inches under ground, in a good rich and light soil, and as far as possible in a sheltered part of the garden. No doubt the Amaryllis should be thought for the most part half-hardy, but Paxton and Lindley, two good authorities, recognise some two or three specimens as actually hardy. Of these, at any rate, we may name two, *Amaryllis Belladonna* and *A. pallida*, the latter being a lovely flesh-coloured flower that blooms in August, introduced among us from the West Indies in 1712.

But, at all events, a large number of this somewhat confusedly classified species require the protection of a greenhouse, and of these something further must be said. Their culture, however, cannot be said to be a matter of difficulty ; but a *rapid* growth should always be encouraged in them, and when their growth is complete, water should be withheld, as otherwise bloom may fail. As for the soil in which to plant the Amaryllis bulb, equal proportions of the usual leaf



THE SCARLET AMARYLLIS.