and excrete toxins which kill the leucocytes. The irritation caused by the microbes generally is followed by dilatation of the vessels of that part and thus more leucocytes are brought up to the fight. This dilatation may be increased by local warmth, and poultices or fomentations are commonly applied to inflamed parts; recently suction apparatus has been used for the same purpose or ligature so as to cause venous stasis (Bier’s treatment). Blisters also cause local dilatation of vessels, but are usually applied to the skin for inflammation in deep-seated parts, such as the lungs, though they also relieve pain in the joints in acute rheumatism. Bier increases the blood in a part by compressing the veins and thus producing passive instead of active congestion. The toxins produced by microbes, if too weak to destroy the leucocytes, induce them to secrete anti­toxins, which not only act as antidotes to the toxins and are injurious to the microbes, but also increase the phagocytic power of the leucocytes (opsonius of Wright). By inoculation with increasing doses of these the resistance of the organism is greatly increased and the invading microbes destroyed. The vaccine is usually made by sterilizing a virulent culture and the proper dose is ascertained by noting the extent to which the power of the leucocytes to envelop and digest the microbes is increased.

Moreover, the products of microbic secretion tend to produce *fever.* The high temperature characteristic of this condition is no doubt injurious to the body itself, but it is frequently more so to the microbe which has invaded the organism; and thus fever, instead of now being regarded as a morbid condition to be suppressed by every means in our power, is considered to be a reaction of the organism tending to protect it by destroying the infection. But it must be kept within limits, lest it should of itself cause death, and here again we see the difference be­tween empirical and rational medicine. Fever is not to be looked upon as an unmitigated evil, to be removed if possible, but rather as a defensive mechanism by which the organism may prevent invasion from noxicus microbes. Nevertheless, as in a campaign the general’s plan may be spoiled by too hasty or too eager action on the part of some of his troops, so the de­fensive arrangement carried to excess may prove injurious or fatal to the organism. Thus too great a rise of temperature in fever may kill the patient; and the aim of therapeutics is to restrain the temperature within proper limits, neither allowing it to rise too high nor to fall too low. The old plan of lowering it by means of cold baths was known to Musa, the physician of Augustus, and by it he saved the emperor’s life; but the same treatment killed the emperor’s nephew. The introduction of the clinical thermometer, which allows us to ascertain exactly the amount to which the temperature rises in fever or to which it is reduced by antipyretic measures, is to the physician like the compass to the sailor, and allows him to steer safely between two extremes.

After the struggle between the organism and the microbes is over, even when it has ended victoriously for the former, injuries are left behind which require repair. Every one has noticed after prolonged fever how thin and weak the patient is, and both the muscular and nervous power throughout the whole body are sadly in want of repair. Where there has been local mischief due to inflammation the dead leucocytes must be re­moved, and this is done either by their being converted into pus in one mass, and making their way through the tissues to the nearest surface, whether of skin or mucous membrane, from which it can be discharged, or they may undergo a process of fatty degeneration and absorption, leaving behind in some cases cheesy matter, in others hard connective tissue.

Poisons formed by microbes are partly eliminated by the kidneys, partly by the mucous membrane of the stomach and intestines, and possibly also by the skin. In old days free elimination by these channels was looked upon as a sign of returning health, and was termed a “ critical ” diuresis, diarrhoea or sweating, according to the channel through which the elimi­native act had occurred.

By therapeutic measures we strive to limit as far as possible the entry of injurious microbes into the organism, to expel or destroy them and their harmful products, and to maintain the strength of the organism itself. One of the influences which is most injurious to the body, and favours most the invasion of microbes, is *chill.* So much is this the case that some diseases which are now known to be due to infection were formerly attributed entirely to the effect of cold. Thus pneumonia is now known to be due to the diplococcus pneumoniae, and yet its invasion occurs so frequently after a chill that it is almost impossible not to look upon chill and pneumonia as cause and effect. The reason of this appears to be that the diplococcus is frequently present in the mouth or air-passages without giving rise to any symptoms; but when the patient is exposed to chill, and the tissues of the respiratory passages are thereby weakened, the diplococcus grows, multiplies and gives rise to inflammation of the lungs. Even what are known as common colds are probably due chiefly to microbic infection aided by a chill, just as in the case of pneumonia. Therapeutic measures which are commonly adopted in the treatment of a cold have for their object to destroy the microbes before they penetrate fairly into the organism, and to restore the balance of the circulation and increase the strength of the invaded parts. Thus carbolic acid or carbolized ammonia are sniffed into the nose to destroy the microbes there, or the nose is washed out by an antiseptic solution as a nasal douche; bismuth or mor­phine arc insufflated, or zinc ointment is applied, to cover the mucous membrane, and protect it from further irritation; and various antiseptic gargles, paints and powders applied to the pharynx in order to prevent the microbic inflammation from extending to the pharynx and down the trachea and bronchi, for many a severe bronchitis begins first by sneezing and nasal irritation. Sometimes the patient is put to bed and the circula­tion is encouraged, especially on the surface of the body, by the use of hot spirits and water, or opium and ipecacuanha, while the outside of the nose is protected to a certain extent from loss of heat, and consequent irritation, by smearing it with a tallow candle or rubbing some ointment over the skin. At the same time, if the throat has begun to show signs of being involved, a hot poultice or wet pack is applied to the neck.

Both inflammation and fever are protective processes cal­culated to defend the organism against the attacks of microbes. But protective processes misdirected or carried to excess may become injurious or even dangerous to the organism. As an instance of misdirection, we may take the irritation which remains in the eye after a particle of dust has been removed, or the itching of the skin which occurs in eczema. The irritation of the conjunctiva caused by dust leads to winking of the eye­lids, lachrymation and rubbing, which tend to remove it; but after the dust has been removed violent rubbing tends rather to keep up the irritation; and sometimes, if the particle of dust remains under the eyelid and is sharp and angular, the process of rubbing may cause it to injure the conjunctiva much more than if it were left alone. In the same way itching is often caused by the presence of insects or other irritants upon the skin, and it tends reflexly to cause rubbing, which is useful by removing the irritant. But when the irritation is situated in the skin itself, as in eczema, the scratching tends to increase inflammation, and makes the irritation worse. In the same way, the reflex act of coughing is useful in removing either foreign bodies or excessive secretion from the air passages; but when the mucous membrane of the respiratory tract is irritated and inflamed, it produces a feeling of tickling and a desire to cough sometimes very violently; yet the coughing simply tends to exhaust the patient, because there is really little or nothing to bring up. The same is the case in inflammation of the lung substance itself. As an example of excessive action we may take sneezing, which is calculated to remove irritants from the nose, but when too powerful may cause the patient to burst a blood-vessel. In phthisis also, although there may be some expectoration to bring up, yet a good deal of the irritation is in the lung substance, and the efforts of coughing are far greater and more continuous than are required for the removal of