## CHAPTER XIII.

### *SUNSTROKE.*

*Synonymes.*—Heat Apoplexy—Insolation—Sun-Fever.

We have records of sunstroke from the earliest historical times. It is fully described by ancient medical writers. About the first cases mentioned are the following, from biblical history:

"Manassas was her husband, who died in the early har vest: for, as he stood among them and bound sheaves in the field, the heat came upon his head, and he fell on his bed, and died in the city of Bethuliah." The second instance relates to the son of the Shunammite woman, who was restored to life by the prophet Elisha: "And when the child was grown, it fell on a day that he went out with his father to the reapers. And he said unto his father, '*My head, my head.*' And when he had taken him and brought him to his mother, he sat on her knees till noon, and then died."

Sunstroke is not confined to tropical regions; New York and other Northern cities suffer from its yearly visitations. At certain seasons the number of cases, in proportion to the population, far exceeds that of the more tropical towns. In New York, especially, the mortality has been very great.



During the summers of 1866 and 1868 an immense number of cases were recorded.

Visitors to the tropics from the colder regions, who are unaccustomed to a high temperature, are particularly susceptible; while the natives, who live constantly exposed to the heat, are comparatively safe.

Sunstroke does not depend upon a short exposure to the direct rays of the sun; the exposure must have been continued for a day or two; nor does it necessarily arise from solar heat. Prolonged confinement in the heated atmosphere of a building may likewise produce it.

Dr. Maclean * speaks of thirteen cases which occurred under Mr. Longmore, in the barracks at Burrackpoor, India, while only three arose from outside exposure. The same thing has been witnessed on crowded vessels, in laundries, and sugar-refineries. I recall three fatal cases which were admitted to Bellevue, of persons who were prostrated while at work in a sugar-refinery. Dr. Swift gives the history of twelve persons who, while at work in a large laundry in this city, were similarly affected. Some of these patients may have been exposed to the solar rays, but the majority were at work in-doors.

About the third or fourth day from the commencement of a heated term, sunstrokes usually appear. The sufferers in most cases are exposed to the heat for some days preceding the attack.

In the summer of 1866 the majority of sunstroke cases —generally laboring-men—were brought to Bellevue Hospital in the morning or early in the day.

* Reynolds's Practice, article Sunstroke, p. 156.

Persons of intemperate habits and debilitated systems are most liable to attack. Any thing tending to lower the vitality of the system predisposes to the affection. Wearing heavy, dark clothing, or compressing the chest, is also unsafe. The close-fitting regulation uniform and equipments worn by the British soldiers in India swelled the bills of mortality from sunstrokes when that country was first occupied. Better sanitary ideas of soldiers' dress have been developed within the past few years, and the death-list has consequently diminished.

Sunstrokes may be classed under two heads: 1. Those in which the nerve-centres are principally involved, or the cerebro-spinal variety of Morehead; 2. The varieties which are characterized by exhaustion. Death in the former case results from *coma;* in the latter, from *syncope*. In some forms death is ascribed to asphyxia, or apnœa.

Persons of full habit addicted to the use of spirituous liquors are generally victims of the cerebro-spinal variety. Hard-working individuals are more liable to the cardiac form.

In typical cases of sunstroke the symptoms may be divided into premonitory and immediate. The premonitory symptoms are not always evident. The patient complains of headache and a burning sensation about the head, and during the night is restless and wakeful. The skin is dry and uncomfortably hot, and there is frequent desire to evacuate the bladder. The face is flushed, and eyes congested; the bowels are usually constipated. A person presenting these symptoms, who, nevertheless, continues to work under the hot sun, or in an overheated building, will be suddenly seized with vertigo, intense headache, and



dimness of vision. His limbs refuse to support him, and he soon falls to the ground. Insensibility sets in; the breathing becomes stertorous, pupils contract, and the skin is intensely hot. The temperature of the body, ascertained by a thermometer in the axilla, varies from 100 to 107, in rare cases reaching 109. The pulse is rapid, and often full; as the case progresses toward a final termination, it becomes weaker and irregular, but still very rapid. The coma may be either partial or complete, and occasionally there are convulsions. The bowels are sometimes relaxed, and vomiting is not infrequent.

There are various grades or manifestations of sunstroke. Some who come under the physician's care complain of intense weakness, and pain in the head. Others are stupid and wandering, while complete insensibility accompanies the great majority of cases. In some the general *malaise* and warning symptoms precede the insensibility for several days; others are stricken down in a moment, without previous uncomfortable sensations.

In those varieties of sunstroke characterized by exhaustion or syncope the patients are more apt to die suddenly without special premonitory troubles. In such cases the countenance is paler than in the cerebro-spinal variety. The respiration is sighing or gasping instead of being stertorous. The pulse is generally rapid, compressible, and irregular. The pupils may be dilated, the heat of the skin is not extreme; sometimes there is a combination of the cardiac and cerebro-spinal varieties.

The reason why consciousness is lost, from exposure to extreme heat, is not fully understood; overheating of the blood is said by some authorities to call for excessive action

in the nerve-centres, which rapidly exhaust their force and power.

Maclean and others regard the heated blood as producing great depression of the nervous system, and thus preventing it from performing its functions. The latter theory seems the most plausible.

Even if we accept this view, there are changes in the nerve-fibres and cells which we have as yet been unable to recognize or fully understand. These changes, in many cases, make recovery from sunstroke more to be dreaded even than death itself. They give rise to the varied sequelæ of sunstroke, such as amaurosis, obstinate and distressing headache, and impairment of the intellect.

Insanity in its varied forms is a common sequence. In some instances, the brain is found to be softened after death, in others there is no special lesion perceptible.

On *post-mortem* examination the brain and its membranes are usually found to be congested. In persons who die from exhaustion this feature is less marked. The great mass of cases, however, show this change. Out of twenty-two *post-mortems* which I made in Bellevue, twenty presented cerebral congestion. All had marked congestion of the lungs. Two of them showed evidences of inflammation in the mucous membrane lining the stomach and intestines. Before death they had violent attacks of vomiting and purging. Congestion of the lungs is almost always present. The right side of the heart is distended with blood which is entirely fluid, and without tendency to coagulate. Decomposition proceeds rapidly after death from sunstroke.

*Treatment.*—It was considered imperative at one time to abstract blood in all cases of sunstroke. Modern enlightenment has excluded this therapeutical agent. Depleting measures of every kind are now considered injurious.



The patient should be removed at once to a cool room, and placed in a recumbent position near an open window. The clothes are then stripped off, and a stream of water poured over the body. The vessel containing the liquid is to be held about four or five feet above the patient, in order that he may receive the benefit of the shock. The stream of water should at first be directed on the head, then on the chest and abdomen, and finally on the extremities, and thus alternating from one part to another, until consciousness returns. Ice rubbed over the body is liked by some; the cold douche is, however, preferable.

When the dyspnœa is marked, a few dry cups placed on the thorax in front and behind will be of service.

Internal medication is useful in all cases. Among the numerous drugs employed, bromide of potassium has been found most efficient. The best results were obtained from its use in Bellevue Hospital, in the years 1866 and 1868. This drug may be administered in all stages of the affection. When the patient is unable to swallow, it can be given by injection, always remembering to increase the dose one-quarter more than when given by mouth. In mild cases from five to ten grains may be given, at intervals of from half an hour to one hour, until the grave symptoms disappear. In several forms from ten to thirty grains may be administered every half-hour; when the pulse becomes weak or intermittent, stimulants are needed. Stimulation should be resorted to in all cases where exhaustion is the prominent feature. Brandy-and-milk, or brandy with ammonia, must be introduced into the stomach or rectum.

The cold douche must be sparingly employed, or altogether dispensed with in this latter class of cases. If the skin is cold, it will do no good whatever.

After consciousness has returned, mustard-plasters or blisters are to be applied to the back of the neck or behind the ears. The bromide need not be discontinued for one or two weeks.

As soon as convenient, the patient should be sent to a cool district in the country, and kept free from all sources of excitement. The brain must rest from all work. Exercise in the open air and nourishing diet are essential; regular habits must be rigidly enforced. A continuance of this treatment for several months prevents or at least lessens the danger from nervous affections which follow sunstroke.

## CHAPTER XIV.

### *DYSPNŒA.*

Dyspnœa from Asthma—Croup—Congestion of the Lungs—Cardiac Disease—Pulmonary Œdema—Pulmonary Apoplexy, etc.

Shortness of breath or difficult respiration arises from defective aëration of the blood. Any condition which diminishes the amount of oxygen sent to the tissues, or creates a demand for more than the lungs in ordinary respiration can furnish, will occasion dyspnœa. Over-exertion produces the simplest illustration of the manner of its production. Violent muscular movements quicken the cardiac impulses, and a larger amount of blood is sent to the lungs as well as to other organs. There follows a demand for more oxygen, and the respiratory movements are increased to make up by rapidity of inhalation the diminished quantity of that element in the blood.

In the category of diseases characterized by dyspnœa are included asthma, croup, congestion of the lungs, cardiac affections, pneumonia, bronchitis, pulmonary œdema, pulmonary apoplexy, and œdema glottidis. The dyspnœa which is caused by mechanical obstruction or occlusion of the air-passages is considered in another chapter.

Asthma.—In this disease there is a spasmodic contraction of the muscular fibres of the smaller bronchial tubes,

and a consequent diminished calibre of these tubes, which prevents the free ingress of air. Asthma exhibits a preference for certain localities and seasons of the year. It may occur at any season, but prevails specially in the autumn. It is said to be caused in some instances by the inhalation of new-mown hay, ipecac, coal-dust, and other substances. Inflammation of the bronchial tubes also excites it. It is not an unfrequent accompaniment of emphysema.

The paroxysms usually develop suddenly. The patient struggles for breath, and runs to the open window. The respirations are not quickened. A wheezing noise is heard with each respiratory movement. The voice is low and husky. The face is congested, the lips blue, and the eyes prominent. A cold perspiration appears on the surface. The pulse is small, and in some cases very rapid. There is inability to maintain the recumbent position. The patient usually sits bent forward and resting on his knees, bringing every auxiliary muscle of respiration into use to obtain air. On auscultation, loud sibilant and sonorous râles are heard over both lungs. The attack usually lasts from half an hour to four or five hours; but it may continue with varying degrees of severity for two or three days.

The absence of œdema, valvular lesions, febrile excitement, etc., and the comparative good health between the paroxysms, are sufficient to distinguish the disease.

*Treatment.*—Pure oxygen has lately been employed with considerable benefit in this disease. Five or six gallons should be inhaled every fifteen or twenty minutes until relief is experienced. Even where it does not completely subdue the paroxysm, it will at least diminish the distress.



Chloroform, ether, and other anæsthetics, may also be given with advantage. There are some cases which can only be relieved by these medicines.

The majority of practitioners employ simple antispasmodics, such as stramonium, belladonna, or lobelia. The former drug may be given in two-grain doses every half-hour, or the leaves may be smoked in a pipe, or in the form of cigarettes, until relief is obtained. Hoffman's anodyne may be used in conjunction with inhalation of steam. A basin of hot water is held under the patient's head, the anodyne is poured slowly in, and the ethereal vapor mixes with the steam, and is inhaled. A blanket thrown over the head of the patient prevents the steam from escaping. Belladonna in quarter-grain doses of the extract relieves certain varieties of asthma with great rapidity. Emetic doses of lobelia, eupatorium, or ipecac., are recommended by some.

Croup.—There are two principal varieties of this disease, viz., membranous and spasmodic. The first is an inflammatory affection, attended with fibrinous exudation, and is usually fatal. In the second there is a spasmodic contraction of the muscles which govern the vocal cords. It may appear with or without catarrh of the larynx, and is rarely if ever fatal. As the spasmodic variety is more rapidly developed, and as a rule unattended by premonitory symptoms, it may properly be considered a case of emergency, and discussed in this connection.

The spasm of the vocal cords which occurs in spasmodic croup may arise from the reflex irritation of worms in the alimentary canal, from teething, or from a cold or catarrh. The attack comes on in the night. The child wakes from

its sleep with a loud, heavy, croupous cough, husky voice, and intense dyspnœa. The face becomes dusky and livid, and the extremities are cold. In a short time the spasm relaxes, and the child resumes its natural breathing; but the hard cough and changed voice remain longer. If the attack be connected with catarrh, the hoarseness is more likely to continue, and the paroxysms will recur at various intervals during the night. It is differentiated from membranous croup by the absence of exudation on the tonsils, constitutional and local signs of inflammation, and also by the fact that in spasmodic croup there is complete relief between the paroxysms. In the membranous or true croup the dyspnœa continues or increases as the disease advances.

*Treatment.*—An emetic composed of a drachm or two of the wine of ipecac., or four or five grains of the powder, should be administered without delay. The child should then be immersed in a hot bath for five or ten minutes. When taken out, warm blankets should be wrapped around the body, and hot flannels or hot hop-poultices applied to the throat. To prevent a recurrence of the paroxysm, all sources of irritation should be removed, and the general health sustained by attention to diet, nutritious food, good air and exercise. If there be a strong predisposition to these attacks, small doses of bromide of potassium, belladonna, valerian, etc., may be given with salutary effect.

Membranous croup is treated by inhalation of steam, oxygen, and internal administration of iodide of potassium; tracheotomy is sometimes performed. Recovery is rare.

Congestion of the Lungs.—Dyspnœa which occurs from engorgement of the pulmonary capillaries is rarely as



sudden in its origin as that which arises from croup or asthma. Congestion is due to a variety of causes. It is an accompaniment of pneumonia and bronchitis, and is a fatal element in the latter stages of cardiac disease. Patients with valvular lesions or other organic affection of the heart are after unusual exertion liable to congestion. The debilitated heart beats with greater rapidity and violence, and the lungs, already overloaded with blood, become rapidly engorged. The respiratory movements are almost doubled in endeavoring to introduce the necessary amount of oxygen.

The patient sits up in bed, moving the head from side to side, and gasping for breath. There is an expression of great anxiety, and the face is bathed in cold perspiration, and marked by the characteristic cyanosis. The pulse is irregular, rapid, and intermittent. Sometimes the overloaded blood-vessels relieve themselves by rupture, and pour out blood into the parenchyma of the lung, and into the bronchial tubes. If the extravasation is great, a fatal termination is reached in a short time; a small hæmorrhage is of little consequence.

*Treatment.*—Medicines which diminish the frequency of the heart's action are indispensable. Digitalis is the best remedy we possess for the purpose. Aconite and veratrum viride are preferred by some. Digitalis may be given in powder, tincture, or extract. The tincture is the most reliable preparation. It may be given in five-drop doses every half-hour until the patient is relieved. With the internal medication the application of a dozen dry cups to the chest is called for. If the patient is not very much debilitated, a few wet cups may be applied. Inhalations of

oxygen gas are also beneficial. The subsequent treatment consists in restraining the patient from all active exercise, and keeping the action of the heart within proper limits. Every source of mental excitement must be avoided. Tonics, good diet, and fresh air, are always necessary.

Congestion dependent upon pneumonia or bronchitis is relieved by cathartics, counter-irritation by means of blisters, abstraction of blood with wet cups, and promoting diaphoresis by small doses of antimony or ipecac.

Pulmonary Œdema is induced by conditions which give rise to œdema in other parts of the body. It occurs in cardiac disease, and in degeneration of the kidneys. The serum is poured out from the distended vessels into the air-cells and areolar tissue of the lungs. Both lungs usually are affected. In the recumbent position the serum gravitates to the posterior portion of these organs. The exudation usually takes place gradually, but it may be poured out so rapidly as to destroy life in a few moments.

Urgent dyspnœa marks its occurrence. The patient's face and limbs may be swollen from œdema, or other signs of Bright's disease, or cardiac diseases, may be present. The immediate symptoms are the same as those arising from congestion. A positive diagnosis, however, cannot be made without the physical signs. There is dulness posteriorly over the lower lobes of both lungs, which was not preceded by inflammatory symptoms. The respiratory murmur is diminished in intensity, and small sub-crepitant or crepitant râles of a liquid character are heard over the same locations. There is also a cough, with a frothy, limpid expectoration.

*Treatment.*—The chief indication is to diminish the quantity of serum in the lung-tissue, and this is done by



abstracting serum from the blood through the skin and bowels. If the debility is not too great, small doses of elaterium or croton-oil may be given, to produce free evacuations from the intestines. Hot-air baths, hot bottles and blankets are useful in promoting perspiration. Acetate of potash may be given to act on the kidneys and increase the flow of urine. Wet cups, applied to the chest-walls posteriorly, are also beneficial.

Dyspnœa, arising from œdema glottidis and mechanical occlusion of the air-passages, is considered in other chapters.