

cates an amount of damage done by the effusion such as to be incompatible with recovery. In the favorable cases the rigidity of the neck and spine gradually subside, but do not entirely disappear for some time after recovery; the vomiting ceases; the headache subsides but does not entirely disappear, and the strength is slowly regained. From the well-marked cases, as just described, to the abortive form, there are numerous gradations in severity. During every epidemic, and also of those occurring sporadically, many of the cases are very mild. In such examples we observe the sudden onset, considerable headache, stiffness of the muscles, but little or no delirium, and no symptoms of depression.

The Fulminant Form.—In this form we find the poison in its most active condition. The patients are struck down in the midst of full health, and pass in a few hours into a state of collapse. There is usually a severe chill; the patient becomes cyanosed; the skin grows cold, and is covered with a clammy sweat; the face shrinks, and is livid; the eyes, surrounded with black rings, sink deeply in their orbits; intense pain is at first felt in the head, but in a short time consciousness is lost, preceded by brief delirium; respiration is slow, labored, and sighing; the pulse is rapid, feeble, and soon ceases at the wrist; purpuric blotches appear on various parts of the body, which sometimes quickly vesicate and slough; the urine is scanty, and loaded with albumen. Such cases prove fatal in a few hours or in a few days. Fortunately, they have occurred less frequently in the later epidemics, and are rare, if not unknown, in the sporadic form.

The Petechial Form.—This differs from the ordinary form, in the greater tendency which the cases exhibit toward dissolution of the blood. Bleeding takes place from the gums and nares, and extravasations occur under the skin at various points, forming petechiæ and vibices. In the severest cases of this form, the symptoms are extreme from the beginning, there are great prostration, extensive purpuric patches, vibices, and ecchymoses, coma appears early, and a fatal result is reached in three or four days. In the lighter cases, the only departure from the course of the ordinary form is the occurrence of numerous and extensive ecchymoses and vibices, and of hæmorrhages from the mucous surfaces. The mortality has apparently not been the greater by reason of this preponderance of the purpuric spots.

The Abortive Form consists in the occurrence of headache, stiff neck and spine, vomiting, without fever, in those who are much exposed to the disease, as mothers, nurses, physicians, etc., but are not susceptible further than this to the action of the poison. The malady in this abortive form does not require confinement to bed, and ceases, without further development, in two or three days. Writers (Ziems-sen) also describe an *intermittent form*, but there are no differences really between this and the ordinary form; for the range of tempera-

ture is so irregular that no typical thermal line can be drawn for this disease.

Course, Duration, and Termination.—None of the acute infectious diseases present such irregularities in their course as cerebro-spinal meningitis. From the course of the fulminant form to that of the ordinary form with the usual complications and the protracted convalescence, diversified by relapses, there is an enormous difference in point of duration. While the former occupies from four or five hours to two or three days, the latter continues four weeks, six weeks, three months, according to the behavior of the several stages. The severe cases of the ordinary form terminate in from one to two weeks. Cases that are very protracted usually terminate in recovery, although various disabilities may remain, but deaths have occurred in the sixth or seventh week (Radcliffe*). The mortality has varied greatly in different epidemics, from eighty to twenty per cent. It seems to be established that the general mortality is declining, rather than increasing, although some recent statistics place it at almost the highest point. In a late Massachusetts epidemic the mortality was a little over sixty-one per cent., and in the last Philadelphia epidemic it was thirty-three per cent. (Stillé). During the same year the mortality at Hardwicke Hospital, Dublin, was eighty per cent. (Radcliffe). The sporadic cases are as a rule much less severe than those during an epidemic. The severity of the disease is increased by various complications, and the recovery hindered by sequelæ. The most important of these complications is broncho-pneumonia and albuminuria. As regards sequelæ, every epidemic leaves behind sad examples of the ravages committed in the brain and organs of sense. One of the most usual cerebral affections left by the disease is chronic hydrocephalus. After the cessation of the inflammation, morbid products, contracting and solidifying, compress the vena Galeni and the straight sinus; the ependyma undergoes considerable thickening, and the fluid in the ventricles increases. Flattening of the convolutions and atrophy of the brain are the results. In the cases which have come under the author's notice, the head was large, the mind weak, the skull apparently thin, the eyes prominent, the extremities paretic, and the muscular acts incoördinate. Headache is a pretty nearly constant symptom; but, at intervals which are, however, not regular, paroxysms occur in which intense headache, vomiting, vertigo, and prolonged stupor with delirious intervals occur; sometimes there are convulsions, unconsciousness, and involuntary evacuations, or there may be merely severe headache, intolerance of light and sound, vertigo, and vomiting. If the interval between the seizures is long, considerable improvement may take place in the general health, and expectations of recovery may be entertained. Usually

* Dr. J. Netten Radcliffe, Reynolds's "System," article "Cerebro-spinal Meningitis," American edition, H. C. Lea's Son & Co., 1880.

death takes place in one of the seizures, or the patient may be cut off by some intercurrent disease. Recovery very rarely ensues, if possible at all. Partial recovery is not uncommon—the mind being weak, the special senses impaired, members paralyzed and deformed. Paralysis of cranial nerves, hemiplegia, defects of speech, etc., are results of cerebro-spinal meningitis produced by the organization of the exudation, the pseudo-membrane causing injury of parts by pressure. The special senses are very frequently permanently damaged. The eye is injured by a simultaneous suppurative inflammation, and by the extension of the inflammation along the sheath of the optic nerve. Iritis, choroiditis, retinitis, opacities of the cornea, are the most important. The auditory nerve is readily injured, owing to its softness of texture; hence we may suppose the frequency with which impaired hearing results, but inflammation of the internal and middle ear often occurs simultaneously with the inflammation of the meninges. Further, inflammation may extend by contiguity of tissue along the sheath of the auditory nerve. The result is that, in a large proportion of cases, dullness of hearing to deafness is found to exist after the termination of the disease.

Diagnosis.—Cerebro-spinal meningitis may be confounded with tubercular meningitis and typhoid fever. The distinction between tubercular and epidemic meningitis rests on these points: the former is always sporadic; is preceded by prodromic symptoms; its course is marked by decided crises; the rhythm of the pulse and respiration is much disturbed, and there are no eruptions. As, however, the same tissue is involved and by an analogous process, it need not occasion surprise that these diseases present very similar symptoms. The differentiation from typhoid rests on these points: typhoid comes on more slowly, is without the intense headache, the muscular rigidity, and the causeless vomiting of meningitis; in typhoid there is diarrhoea—in meningitis, constipation; in typhoid there are some hebetude of mind, muttering delirium, stupor—in meningitis, active delirium terminating in coma, or stupor interspersed with delirium; in typhoid there is a typical thermal line—in meningitis there is no regular course to the fever; in typhoid the disease develops slowly to its maximum—in meningitis the maximum is reached in four or five days; in typhoid there is a characteristic rose-colored, lenticular eruption—in meningitis there are various kinds of eruptions, pursuing no definite plan.

Treatment.—The accumulated experience of the medical profession seems now to indicate the superiority of opium as a remedy for cerebro-spinal meningitis. The author has witnessed some striking examples of its value, especially in the form of morphine hypodermatically. In Germany it holds the first place (Ziemssen). In various epidemics, Boudin has found opium the only remedy worthy of confidence. Stillé

strongly advocates its employment. There are two points in regard to the administration of opium, on which the author strongly insists—early and efficient administration. It should anticipate the effusion by an antagonistic action on the vessels. To accomplish this object, large doses of morphine are necessary, for, as every observer has witnessed, there are a remarkable increase of the arterial tension and slowing of the heart produced by a full dose; and these are the conditions most necessary to prevent migration of the white corpuscles. Aside from theoretical considerations, it has been observed that there is a singular tolerance of opium in this disease. A decided effect should be produced, and the quantity necessary must be prescribed. The period when opium or morphine may be most useful is limited by the effusion; after the first four or five days it is less important, but its utility does not cease until the symptoms of depression come on. Quinine and ergot have both been largely used in this country, with and without opium, but the evidence in favor of these remedies is not satisfactory. If there is active delirium, fluid extract of gelsemium (one to five drops every two to four hours) is useful in allaying excitement. When the period of depression approaches, quinine, carbonate of ammonia, and especially turpentine, which is more particularly indicated when the skin is relaxed and cold, are the most useful remedies. Although ice-bags and cold applications are much advised for the head and spine, the author holds that they do mischief by the depression of the circulation which they cause. He advises instead, the use of hot water applied by a sponge, passed over the spine every two or three hours. If there is constipation, a mercurial purgative may be given, but the best authorities condemn the use of mercury to procure absorption of the inflamed products—a bit of English practice lately revived in Germany. On the other hand, iodide of potassium has been used with success to remove adventitious products after the acute attack has subsided. The success of this measure will be promoted by the frequent application of a hot douche to the spine, flying-blisters, and the passage of a weak, continuous galvanic current, but not until all local disease has wholly subsided. As this disease is marked by great depression of the vital powers, stimulants are needed early, but they should not be given recklessly. When the pulse becomes stronger and more regular under their use, they do good; but, if the tongue grows dry and the delirium more exciting, they do mischief. A generous diet is required from the outset. Milk, eggs, beef-juice, mutton-broth, etc., should be given every three hours, day and night, to avoid paroxysms of weakness in the early morning.

INFLUENZA—EPIDEMIC CATARRH.

Definition.—*Influenza* is a specific epidemic disease, self-limited, characterized by catarrh of the respiratory organs, and sometimes of the digestive, and by nervous symptoms and debility.

Causes.—Epidemics of influenza have appeared from early in the sixteenth century until the nineteenth. Parkes, however, traces back epidemics to the ninth century. The usual duration of an epidemic is two to four years, during which the whole habitable globe may be visited. An epizootic, similar in all respects to the epidemic, in the human family, has occasionally prevailed as widely among horses. Influenza occurs in all climates and latitudes, and visits on its rounds all countries in both hemispheres; but it may limit its ravages to one hemisphere, or to a single country. The rate of its progress varies: thus Europe has been gone over in six weeks by one epidemic—in six months by another. The rate of spread varies as much in particular countries visited, and a month has been consumed in the extension of the epidemic influence from London to Edinburgh (Parkes). As it prevails under all conditions of soil and climate, and is not contagious, there must be present some morbid principle in the atmosphere. That it is a minute organism is a theory which best explains the facts connected with the spread. During several epidemics it has been observed that various kinds of fungi flourished in unusual abundance. There is no regular period of incubation, but attacks occur immediately on exposure, and in other cases not for some days. One attack does not procure an exemption from future ones.

Pathological Anatomy.—The changes of structure proper to this disease are limited to the broncho-pulmonary mucous membrane. An intense hyperæmia takes place in the nasal, pharyngeal, laryngeal, tracheal, and bronchial mucous membrane. The hyperæmia is usually confined to the larger tubes, but it may extend to the finer tubes, so that atelectasis may be associated with it. Pneumonia, both croupous and catarrhal, are occasional complications. In a portion of the cases the gastro-intestinal mucous membrane is also strongly hyperæmic, and a quantity of watery or thick viscid mucus is produced, but this seems accidental. Doubtless, changes in the blood and in the nervous system, of a very subtle kind, must take place, for those occurring in the respiratory tract are not adequate to explain the nervous symptoms and the evidences of blood-poisoning.

Symptoms.—The onset of the disease is sudden. There may be a decided chill, or chilliness alternating with flushing and heat, and fever at once comes on, soon rising to the maximum, but in other cases the febrile symptoms develop slowly, and do not attain their maximum until two, three, or even four days. The course of the fever is remittent, the exacerbations occurring at night. With the rise of tempera-

ture there is an increase in the pulse, the number of beats approximating 100. At the same time a severe headache, located in the frontal sinuses and extending into the eyes, is experienced. Soon after the rise of temperature, in respect to which all observers are agreed, the symptoms of an acute catarrh come on: there occur heat, stuffing, dryness, quickly followed by increased secretion, and sometimes epistaxis; the conjunctivæ are injected, and the eyes are watery; presently the throat feels hot, dry, and irritated, and spots like measles are to be seen on the palate; the mucous membrane of the mouth and tongue are also hyperæmic, but less so than the fauces. Soon the voice grows husky; a troublesome cough, and, after a time, abundant thin, acrid mucus, and afterward purulent expectoration, are brought up, but at first the cough is hard, dry, and tormenting, especially in the evening and at night, and occasionally vomiting is excited by it. At first there is almost incessant sneezing, but this subsides as the secretions increase. As the catarrh descends into the respiratory organs, the symptoms grow more serious. The expectoration may become bloody; more or less dyspnoea is experienced by many, and sharp stitches are felt in the sides; sibilant and sonorous *râles* are audible over the tubes, and the signs, rational and physical, of pneumonia or pleuritis may be added to those of the disease proper. Instead of this gradual progression of the symptoms from above downward, the nasal, pharyngeal, laryngeal, and tracheal mucous membrane may be affected simultaneously. In ordinary cases the catarrh reaches its maximum on the second, third, or fourth day, and then declines, ceasing after some days longer. As the symptoms develop along the respiratory tract, in a portion of the cases the gastro-intestinal mucous membrane is affected. At first the œsophagus is attacked, then the membrane below. The appetite is gone, there is a good deal of nausea, and vomiting occurs spontaneously, or is excited by the cough or by the presence of food. The epigastrium is painful and there are colicky pains; sometimes diarrhoea occurs—sometimes there is obstinate constipation. A remarkable phase of this disease consists in the disturbance of the nervous system, which is quite out of proportion to the gravity of the local disease or to the amount of fever. From the beginning the patients appear anxious and depressed, and are weak, unequal to any exertion, and confused by any attempt at mental effort. There are general muscular pains and soreness, flying pains along the course of the principal nerve-trunks, but the chief source of suffering is the frontal headache. Besides the hebetude of mind observed to a less or greater extent in all cases, there is sometimes delirium; in still other cases a remarkable state of somnolence has been noted. Vertigo is present in most of the cases; and in some there is a decided hyperæsthesia of the skin of the head and neck. Sweating is not usual at first, and if it occur soon is significant of an early subsidence of the fever, but it is

one of the critical phenomena marking the termination of the disease. When there is much sweating, sudamina are present. The urine is usually lessened in amount and sometimes scanty or suppressed. The sweat is said to be highly acid, and the urine also acid and high-colored.

Course, Duration, and Termination—There are great variations in the intensity of epidemics and of individual cases. Some races suffer severely, others slightly. Children are less susceptible, and have the disease more mildly. The weak and cachectic and the aged run greater risks than the robust and young. Uncomplicated cases pursue their course in from four to eight days; the fever reaches its maximum on the third, fourth, or fifth day, and then terminates by crisis or by lysis. The critical phenomena consist in a profuse sweat, a free urinary discharge, an attack of diarrhœa, or an epistaxis. In the cases declining by lysis, several days are occupied in the return to the normal state. Relapses are by no means uncommon. Cough and expectoration due to bronchitis may persist for some time after the disease; the nervous symptoms may linger and delay convalescence, or complications may arise, or sequelæ follow after the disease proper. Capillary bronchitis and catarrhal pneumonia may result by an extension of the morbid process from the bronchial tubes. A severe conjunctivitis, tonsillitis, or laryngitis, may develop from the usual implication of these parts. Besides these diseases, which are merely exaggerations of ordinary lesions, existing maladies may be much aggravated by an influenza. Those so affected are especially phthisis, emphysema, dilated heart. Pregnant women attacked with influenza are apt to abort. Notwithstanding its apparently profound impression on the organism of man, the poison of influenza is scarcely lethal. The mortality of the last epidemics has not exceeded two per cent. where the disease appeared most noxious. Fatal cases, when they occur, seem to be due to the complications which arise in the course of them or to the sequelæ.

Treatment.—Rest in-doors, a generous diet, and the moderate use of stimulants, are the most important measures. At the outset a full dose of quinine and morphine (gr. xv—gr. ss.) exercises a favorable influence; and throughout the disease these are the most useful remedies to quiet the harassing cough and to maintain the strength. If there is much secretion, cocaine, locally, and atropine, may be combined with the morphine and quinine. If the bronchial mucous membrane is severely attacked, small doses of tartar emetic, or ipecac and morphine, are useful (℞ Ext. ipecac fl. ʒ ij, tinct. opii deodor. ʒ iv, tinct. aconiti rad. ʒ i. M. Sig. Six to ten drops every two hours). If the finer tubes are involved, the preparations of ammonia, the iodide, muriate, and carbonate of ammonia, should be freely administered. If the stomach is very irritable, as is the case in many epidemics, the most useful remedies are oxalate of cerium, hydrocyanic acid, minute doses of morphine subcutaneously, carbolic acid, with or

without bismuth, etc. For the violent head symptoms which sometimes ensue, the most appropriate remedies are bromide of potassium, gelsemium, duboisine, morphine subcutaneously, etc. If there is much local distress, the vapor of hot water should be sedulously inhaled. When the first irritation is felt in the nares, a solution of hydrochlorate of quinine should be applied and allowed to pass through into the fauces, after the manner of Helmholtz. It is probable that pilocarpine will be found extremely useful in cases of influenza, administered at the outset with the view to abort the malady. Pellets of cocaine placed in the nares, and allowed to dissolve slowly and pass along the cavities posteriorly, have proved to be an effective application.

HAY-FEVER—SUMMER CATARRH.

Definition.—*Hay-fever* is an acute catarrh of the upper air-passages chiefly, occurring at a fixed period annually, and disappearing after a variable duration. It has received a variety of designations besides those above given, as *hay-asthma*, *rose-cold*, *June cold*, *autumnal catarrh*, etc.

Causes.—Those who suffer from an annual visit of hay-fever refer their malady to a variety of causes, and it is probable that various kinds of emanations excite the disease. It is an interesting fact that three members of our profession, themselves sufferers from the disease, have made the most important contributions* to our knowledge of this affection. By Dr. Bostock the disease was supposed to be of a specific nature, and he rejected, from the point of view of his own experience, the supposed agency of emanations from new-mown hay or grasses. Wyman was unable to come to any conclusion in regard to the supposed agency of minute organisms, whether animal or vegetable, but he has carefully indicated the geographical position of the hay-fever zones in this country. Wyman's attention was directed to autumnal catarrh, as this is the form from which he suffered; on the other hand, Bostock recognized the disease as it occurs in June. Probably the most important investigation ever undertaken is that of Blackley, who has shown that the pollen of rye produced the most violent symptoms of hay-asthma, notably sneezing, profuse catarrh, and oppressed breathing, and that the pollen of grasses, of wheat, oats, and barley was, next to rye, the most active in causing catarrhal symptoms. Further experiments showed that the pollen in the atmosphere consisted in the large proportion of ninety-five per cent. of that

* "Autumnal Catarrh (Hay-Fever)," by Morrill Wyman, M. D., 1872; "Experimental Researches on the Cause and Nature of Catarrhus Æstivus (Hay-Fever or Hay-Asthma)," by Charles H. Blackley, London, 1873, second edition, London, 1880. The disease was first described by Dr. Bostock, giving his own case, "Medico-Chirurgical Transactions," vol. x, part 1, p. 161; also *ibid*, vol. xiv, p. 437, "On Catarrhus Æstivus."

from the grasses—the *graminaceæ*. That these observations and the conclusions based on them are correct, can hardly be denied. But it is probable that other influences are also necessary. Beard has lately published a monograph* based on a study of two hundred cases, from which it appears that there are several factors concerned in the production of this singular malady. He concludes that hay-fever is essentially a neurosis; that the same form of disease occurs in the spring, summer, and fall; that it is hereditary, and a product of modern civilization, and that, when the predisposition exists, various exciting causes may develop the disease. We believe that these propositions are correct. When the neurotic temperament is present, and a special tendency exists, various exciting causes, as heat, dust, but especially the pollen of grasses, of rye, corn, and rag-weed, may excite summer catarrh. Various cases have been published, showing that a mental impression may excite the disease. Phœbus mentions a case in which the symptoms of hay-fever were excited in a susceptible patient by looking at a highly realistic picture of a hay-field.

Symptoms.—There are two forms in which the disease manifests itself—the *catarrhal* and the *asthmatic*—but they are often united in the same individual. Hay-fever is distinctly periodical; it occurs at certain seasons only, which differ in different cases; and, in many persons, it comes on with unfailing promptitude on a certain day. Whether it occur in the spring, summer, or fall, its clinical features are the same.

Catarrhal Form.—There may be warnings of the approach of the disease in a sense of lassitude and weariness, inaptitude for exertion, loss of appetite, a coated tongue, diarrhœa, or constipation, etc., but in a great majority of cases the onset is sudden. In the enjoyment of the usual health, the first symptoms are felt, although it is true those who have had the disease for years know full well the time of its approach, and probably experience various subjective symptoms, which are purely mental in origin. The first symptom is an itching of the eyes, nose, behind the posterior nares, and the palate. This is followed by the flow of a transparent serous fluid, and then sneezing begins, which is most aptly described by Henry Ward Beecher, himself a sufferer from the disease: "You never before even suspected what it really was to sneeze. If the door is open, you sneeze. If a pane of glass is gone, you sneeze. If you look into the sunshine, you sneeze. If you sneeze once, you sneeze twenty times. It is riot of sneezes. First a single one, like a leader in a flock of sheep, bolts over; and then, in spite of all you can do, the whole flock, fifty by count, come dashing over in twos, in fives, in bunches of twenty." The eyes water, and the conjunctiva reddens; the nasal mucous mem-

* "Hay-Fever or Summer-Catarrh: its Nature and Treatment," New York, Harpet & Brothers, 1876, pp. 266.

brane swells and becomes hyperæmic; and so great is the swelling in many instances that the two sides of the passageway approximate, and breathing is then carried on by the mouth. When the swelling occurs, the sneezing is less persistent, or ceases altogether; the discharge which was clear and watery becomes yellowish and thicker, or it may be reddish from an admixture with blood. A very unpleasant sense of heat and burning is felt about the nose and eyes, and pain, which is rather lancinating, shoots through the orbits and frontal sinuses, and sometimes into the head. The throat is hot, dry, and somewhat swollen, and, in consequence of extension of the swelling to the orifices of the Eustachian tubes, the hearing becomes obtuse, and pain sometimes is felt in the ear.

Asthmatic Form.—This begins at the same time, and runs its course with the catarrhal form, or, after an uncertain period, succeeds to the latter. In either case an extension of the morbid process takes place to the larynx and bronchial tubes, which become swollen and hyperæmic; a hoarse laryngeal (croupy) or a wheezy bronchial cough occurs, and asthmatic difficulty of breathing is experienced in varying degrees of severity, from a mere sense of constriction to extreme dyspnoea. In the worst cases the same phenomena are exhibited as in the severe cases of asthma: the patient is unable to lie down, struggles for breath, is pale, and covered with a cold sweat. Remissions occur, but the difficulty of breathing does not entirely cease until the hay-fever is over, and in some subjects more or less bronchitis, with occasional dyspnoea, persists for two or three months afterward. Very alarming symptoms may arise from an extension of the disease to the finer bronchi (capillary bronchitis), or congestion of the lungs may unexpectedly occur, or an attack of pneumonia supervene. Unless some of these secondary diseases happen, the constitutional symptoms are by no means severe. The pulse is a little accelerated, the temperature slightly, if at all, elevated, except during and for a short time subsequent to the asthmatic attacks. The strength is somewhat reduced, the appetite is rather poor, and the discomfort sufficient to render a patient miserable.

Course, Duration, and Termination.—The disease behaves in a definite manner in all cases, and comes on and goes off with the strictest regularity. The duration of individual cases is from a few days to three months, the average being about six weeks. As locality is an important element in the causation, the behavior of cases is much affected by the surrounding conditions. As a rule, if the patient remain at the same place, the violence of the attacks rather increases year by year. Those at first assuming a merely catarrhal form, after a time become asthmatic, and in some instances the author has known the asthma to become a chronic condition, and to occur throughout the year. On the other hand, timely removal from the hay-fever zone