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INFLUENZA:

ITS PATHOLOGY, SYMPTOMS, COMPLICATIONS AND SEQUELS; ITS ORIGIN AND MODE OF SPREADING; AND ITS DIAGNOSIS, PROGNOSIS AND TREATMENT.

BY

1833-1900

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PREFACE.

A SECOND edition of this book having been called for, I have added much new matter, and have endeavoured to give a complete clinical account of Influenza, with its protean symptoms, complications and sequels, such as we have seen them during the epidemics of 1889-91. I have also discussed its origin and mode of spreading, and explained the principles which have to guide us in our diagnosis, prognosis and treatment. Finally, I have added a copious list of British and Foreign contributions to the literature of the subject, which have appeared during the last three years.

48, HARLEY STREET,

April, 1892.

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INFLUENZA.

CHAPTER I.

THE BACTERIOLOGY OF INFLUENZA.

THE word "influenza" being somewhat long, and, as it seems to me, not very happily chosen, I propose to use the term "grip," by which the disease is known in Germany and France, but spelt as an English word, as synonymous with influenza. I hope that this innovation may be generally accepted, not only because the term is short, but also because it graphically denotes the suddenness with which the disease attacks the patient. I remember having had grip as a boy during the epidemic of 1848, and can well recall the utterly unexpected and rapid manner in which I was seized with fever and dreadful pain in the head and the body, having felt quite well only an hour before. Another reason for accepting the term "grip" as equivalent to influenza is, that it is really impossible to speak of the "influence of influenza," as one often feels tempted to do when talking or writing about it, while

the "influence of grip" may pass muster anywhere. I also use derivatives of the word "grip," calling a patient who has influenza "gripped," and speaking of "grippal" pneumonia, and of "post-grippal" psychoses.

There can be no doubt that the epidemics of grip of the years 1889-91 have been the most interesting medical event of late years, and that they have taught us a great many lessons which we did not know before. Indeed, the disease not having appeared in England in an epidemic, or, rather, pandemic form for many years past, was unfamiliar to the present generation of practitioners; more especially as in numerous cases the signs of catarrh of the respiratory organs, commonly called "influenza cold," and which were generally believed to be characteristic of the complaint, were either slight or completely absent, the most striking symptoms of the distemper having been in the majority of cases a sharp and short attack of fever, great physical and mental prostration, and severe pain in the head, body, and limbs, most or all of these symptoms ceasing as suddenly as they had appeared.

In accordance with our present views as to the mode in which infection takes place, I look upon the symptoms of influenza as due to the action in the system of a special toxine, secreted by a pathogenous bacillus. The earlier researches by Ribbert,[1] Finkler,[2] Weichselbaum,[3] Gruber,[4] Kowalski,[5] Levy,[6] Klebs,[7] Babes,[8] Vail-

lard and Vincent,[9] Sée and Bordas,[10] Prior,[11] Bein,[12] Kirchner,[13] Prudden,[14] Petruschky,[15] Bouchard,[16] Scheibe,[17] Jolles,[18] Fraser,[19] Zaufal,[20] Kruse and Pansini,[21] Kollmann,[22] Marmontel,[23] and others, on the bacteriology of influenza, however able and painstaking, were so contradictory, that the morphology of that micro-organism, as well as the chemical constitution of its poisonous secretion, appeared until quite recently a *terra incognita*.

In the first edition of this book I stated, indeed, that everything bacteriological in connection with grip was then quite unsettled, and expressed the hope that, by employing a somewhat different mode of research, the true micro-organism of grip might be discovered, and that then the toxine secreted by it might be isolated, and we should be put in possession of the anti-toxine capable of neutralising the special poison of influenza. Two months after I had penned those lines the researches of Pfeiffer,[24] Kitasato,[25] and Canon[26] were published, throwing a new light on the subject; and, although it might be premature to say that the bacteriology of influenza has been definitely established, there can be no doubt that we have advanced a considerable step further on the road to the satisfactory solution of this question.

Pfeiffer[24] describes the bacilli of grip, which he has obtained from the bronchial secretion, as tiny rods, which

have about half the length of the bacilli of mouse-septicæmia, but are equally wide. Three or four of these rodlets are often seen strung together in the form of a chain. If stained with Loeffler's methylene blue and analogous preparations, it is seen that the two ends of the rods take the stain more intensely, so that forms resembling the diplococcus or streptococcus are produced. It is therefore probable that these micro-organisms were seen by the earlier observers, but that they were misled by the peculiar behaviour of the bacilli of grip with regard to staining agents, and therefore described them as diplococci and streptococci.

Kitasato[25] finds the reason why these bacilli have previously not been properly recognised in the extreme difficulty which is experienced in obtaining pure cultures of them. Indeed, Pfeiffer did not succeed in carrying the culture beyond the second generation. This appears to be chiefly owing to their being contaminated with the numerous microbes which are habitually found in the mouth, these latter growing in such a luxuriant and abundant fashion in nutrient media that they quite overgrow and conceal the special microbes of grip. Kitasato has however succeeded, by employing a peculiarly delicate method, in obtaining pure cultures up to the tenth generation. The individual colonies then present themselves as extremely small points, like the tiniest drops of water, which can during the first twenty-

four hours only be distinguished by the aid of a lens, their minute size being another reason why they have been overlooked by previous observers. If a culture obtained from such a colony be placed on a new nutrient medium of glycerine-agar, small colonies are gradually formed on the moist surface, which have the peculiarity that they always remain separate from each other, and do not, as all other species of bacteria, join together to form a continuous row. This peculiarity is so striking that the bacilli of grip can thereby alone be distinguished with certainty from other bacteria.

In uncomplicated cases of influenza these bacilli have been obtained in pure cultures and in immense quantities from the expectoration of the patients; while in persons whose bronchial tubes had been previously diseased other micro-organisms were found mixed up with them. It has been shown that these bacilli may penetrate from the bronchial tubes into neighbouring tissues, and they were in two cases found post-mortem in pure cultures in a purulent pleuritic effusion. They are never met with in ordinary bronchial catarrh, pneumonia, or phthisis. Their presence keeps pace with the course of the disease; they become rarer, and finally disappear with the cessation of purulent bronchial secretion. Pfeiffer has made numerous inoculation experiments on monkeys, rabbits, guinea-pigs, pigeons, rats and mice. Positive results were obtained in

monkeys and rabbits, while the other animals showed themselves refractory to influenza.

Canon[26] has succeeded in obtaining these bacilli direct from the blood of gripped patients, even in cases where there was no cough or expectoration, and has thereby been enabled to make the diagnosis of influenza where the clinical symptoms alone were uncertain. The micro-organism has thus far been found in all persons who have been examined for it during the feverish attack of grip; and as it does not exist in the blood of other persons, and is a microbe which has not been previously known, this appears to be an additional ground for believing that it stands in direct relation to the disease.

The examination of the blood is made in the following manner:—A drop of blood obtained by pricking the finger is received on a perfectly clean cover-glass; this cover-glass is placed upon another one, and the two are then drawn apart. The preparations, after they have been thoroughly dried, are placed in absolute alcohol, in which they are left for five minutes. They are then taken out and placed in the following staining solution (Czenzynke's solution): ℞ Concentrated watery solution of methylene blue, 40 grammes; ½ per cent. eosin solution (dissolved in 70 per cent. alcohol), 20 grammes; distilled water, 40 grammes. The cover-glasses immersed in this staining solution are placed in an incubator at a temperature of 98·6°, and left there

from three to six hours, after which they are washed with water, dried, and embedded in Canada balsam. In the preparations of blood made in this manner, the red blood corpuscles are red, and the white ones blue, while the bacillus is found stained blue, sometimes in large quantities, but mostly sparingly, and only to be identified after a long search (about 4 to 20 in the preparation).

Canon has also succeeded in obtaining pure cultures of his bacillus from the blood, which was found to be very difficult, because so few of these rodlets are contained in a drop of blood, and their colonies are easily concealed by the coagulated blood on account of their minute size. He used the following proceeding:—The finger is cleaned with sublimate, alcohol and ether, and a needle which has been heated, pushed into it; an assistant then squeezes the blood drop by drop from the puncture, and takes care that the drops do not spread, but retain their globular shape; eight or ten such drops are then transferred to a Petri's dish, and the latter is put into the incubator at a temperature of 98·6°. After twenty-four hours the colonies have already become slightly developed, and are very distinct after forty-eight hours. The pure-cultures obtained from these colonies have exactly the same appearance as that described by Kitasato. It is thus shown that even where there are only very few rodlets in the specimen,

the diagnosis of influenza can by this means be made with certainty. Klein[28] has subsequently published observations made by him in December, 1889, and in January, 1891, both on the blood and the bronchial sputum, which confirm the results obtained by Pfeiffer and Kitasato.

Babes[29] has since then drawn attention to the circumstance that he had already described Pfeiffer's bacillus two years ago as occurring in pure and uncomplicated cases of grip, but that the cases which he had then the opportunity of examining were too few in number to enable him to speak with certainty about that special kind of bacteria as the true excitor of influenza. Moreover there were generally other pathogenous bacteria present in the sputa, which proved more virulent for the animals used in experimenting than the bacillus of grip, and which by killing them rapidly interfered with a clear appreciation of the results. Pfeiffer, on the other hand, had so many cases at his disposal that there could be less difficulty in arriving at a satisfactory explanation of the facts observed. Babes still thinks it prudent to reserve his opinion whether Pfeiffer's bacillus is the real excitor of grip, as he has seen other similar pathogenous bacteria in most of his cases which may possibly also be efficient in this direction.

However this may be, it seems highly probable that infection is habitually produced by the expectoration

charged with the bacillus of grip; and the speedy removal and disinfection of the sputa of patients suffering from influenza are, therefore, as urgently required for prophylaxis as in the case with the sputa of consumptive patients.

The life duration of the bacillus, when circulating in the blood, is seen to be a short one, and probably confined to the duration of the feverish attack. It may however survive much longer in dried sputum; and observations which have been made about apparently inexplicable fresh outbreaks of influenza in localities where it had previously been introduced by human intercourse, tend to show that such bacilli may remain in a state of latent vitality for many months, and again resume breeding when finding a suitable soil. It is also probable that the bacillus may be carried by clothes, merchandise, and other so-called fomites, which have in some way become infected with it, and may thus be transmitted in the ordinary way of traffic to the most distant parts. These points will be more fully dwelt upon in the chapter on etiology.

We are as yet in complete ignorance about the chemical constitution of the special toxine which is secreted by the bacillus of grip; but we know that the virulence of this substance is most remarkable, causing, more especially when it falls on a suitable soil, an immense variety of severe symptoms, not only

during the primary attack, but also in many cases for a long time subsequently, and leading not unfrequently to a fatal issue, or to such destructive lesions of important organs as tend to disable the patient for life. Experience has indeed shown the popular belief that "influenza is not much of a disease," to be utterly fallacious, and it is regrettable to find that such an erroneous notion is shared by members of our own profession. Thus Broussais stated as recently as December, 1889, in a paper published in the *Revue Générale de Clinique et de Thérapeutique*, that influenza "was an invention of needy people, of doctors without patients, whose time hung heavily on their hands, and who had amused themselves with inventing such a bogey." Unfortunately this "bogey" has proved a fearful reality for many people who have lost their lives or their health through it!

Why should the attack of grip end in some cases suddenly with profuse perspiration, and all the other symptoms of a crisis, leaving the patient weak, but really not much the worse for what he has gone through, while in other instances its course is much more protracted, and attended with dangerous complications and sequels? It appears to me that we can give a tolerably plausible answer to this question by reference to what takes place in pneumonia, which has been much better studied in this respect than grip. In pneumonia, as in most other

infectious diseases, it is not so much the circulation in the blood of a special bacillus—Fraenkel's diplococcus—which causes the disease, nor the number of these cocci present which kills, as the poison secreted by them. This poison has recently been isolated by G. and F. Klemperer,[30] who found it to be an albuminoid amorphous yellowish-white powder, which they obtained by precipitating the diplococcus with absolute alcohol, thus killing the parasite, and then dissolving the precipitate in water and evaporating it. A solution of this toxine, when injected into rabbits, caused either death or severe febrile disturbance. It is the pneumo-toxine which, by circulating in the blood, causes the fever and the consolidation of one or several lobes of the lung, and endangers life by depressing the vital energy of the nervous centres of respiration and the heart's action. After the pneumonia has lasted a few days, however, an antidote to the toxine is formed, either from the poison itself, or by its aid from the albumen of the serum. As soon as this anti-pneumo-toxine circulates in the blood, the crisis in pneumonia begins, and the anti-toxine eventually neutralises all the poison which the diplococcus has formed in the system. The serum of the patient thus becomes innocuous; the bacteria are, as it were, disarmed; the system regains its power of resistance, and the diplococcus presently perishes in the same way as other non-pathogenous micro-

organisms, when injected into the blood of animals or men, perish rapidly by the action of the white blood-cells. It may however happen that the quantity of anti-toxine formed in the system is not sufficient for neutralising all the toxine which is in circulation, and then there will be only a pseudo-crisis, the fall of temperature being slight and temporary. Again if anti-toxine remains in excess after the crisis is over, the patient thereby acquires at least temporary immunity; this latter may, however, subsequently be lost again by the disappearance of anti-toxine from the serum. Such immunity may be extended to animals; for rabbits which had been infected with pneumo-toxine, and which otherwise would inevitably have died of it, recovered their health when injected with serum from a patient who was just passing through the crisis of pneumonia. Finally if a solution of toxine was mixed with curative serum, and then injected into animals, no effect was produced, showing that the poison had been neutralised by the addition to it of serum containing anti-toxine.

In connection with this it is interesting to find that Pacini [31] has reported a case of the cure of traumatic tetanus by the hypodermic injection of the tetanus-anti-toxine, which has been discovered by Tizzoni and Cattani.[32] The patient had been previously treated by large doses of hydrate of chloral; but as the symptoms became more severe, 25 centigrammes of tetanus-anti-

toxine obtained from the blood-serum of a dog, which had been artificially rendered refractory to tetanic infection, were injected twice daily. From that time the patient began to improve, and he eventually recovered.

Let us now apply the results of Klemperer's researches to influenza, which appears justifiable on account of the similarity of the morbid processes in the two diseases. I assume, then, that the patient having acquired infection, a poisonous albuminoid secreted by the bacillus of grip, and which I will call the *grippo-toxine*, circulates in the blood, and causes the special symptoms of the feverish attack. In a day or two, however, an antidote, which I will call the *anti-grippo-toxine*, is formed in the serum of the patient. Now let us suppose the quantity of this anti-toxine to be, in a given case, sufficient for neutralising all the toxine which is circulating in the blood; and there will be, as a natural consequence, a crisis, with a sudden considerable fall of temperature, profuse perspiration, and relief to the distressing subjective symptoms. If, however, the quantity of the anti-grippo-toxine formed in the serum should be too small to neutralise all the toxine which may be present, the course of the disease will be protracted, there will be only a pseudo-crisis, and complications and sequels of different kinds will follow.

By the aid of this theory we may also explain why *immunity*, which has been acquired by a patient, may

subsequently be lost again. Let us suppose that all the anti-grippo-toxine which has been formed in the serum is gone, and that the patient is again exposed to infection. A second or even third attack of grip may then take place in the same individual, just as we meet occasionally with a second or third attack of measles, pneumonia, or rheumatic fever, in the same patient. The theory which I have just proposed therefore appears to explain satisfactorily:—

1st. Why patients acquire influenza;

2nd. Why they recover from it, either perfectly or imperfectly; and

3rd. Why, after having had it once, they contract it again a second or third time.

CHAPTER II.

THE FEVERISH ATTACK.

In this chapter I do not intend to give an ordinary systematic description of the feverish attack of grip, which may be found in most hand-books on the practice of medicine, but to consider the symptoms as they successively arise, with regard to their localisation. I trust that, by proceeding in this way, the whole mode of clinical appearance of the malady in its various forms may be more easily understood than could otherwise be the case. It will be my endeavour to show that the symptoms of the feverish attack of influenza are referable to irritant poisoning of definite tracts of the nervous system by the grippo-toxine, and I will first trace the steps by which I have arrived at this opinion.

Shortly after the visitation of influenza had commenced, I was surprised to find, both in hospital and private practice, a number of patients complaining of severe forms of neuralgia, loss of power, and a general break-up of the nervous system, which they attributed to an attack of grip which they had recently passed through. I was also re-visited by some of my former patients who

had for years past remained free from certain nervous affections to which they had previously been subject, but who had seen their old troubles suddenly revived during or after convalescence from grip. Amongst the fresh cases which presented themselves, I found that the state of health of the patients had in a good many instances been quite satisfactory before influenza had laid hold of them, so that this latter appeared to be *fons et origo mali* altogether; while in others a neurotic pedigree, or a previous syphilitic infection, or some other constitutional fault, could be clearly traced, upon which the subsequent nervous affection had as it were been grafted.

It also soon became evident to me that the number of nervous sequels which appeared after grip was largely in excess of other post-febrile neuroses, of which I had seen numerous examples in the course of my practice. In comparing those nervous troubles which may be met with after such diseases as diphtheria, typhoid fever, scarlatina, small-pox, measles, erysipelas, and malaria, with those seen after influenza, none of the former, nor indeed all of them put together, approached in number the nervous sequels of grip.

I could not help being very much impressed with these facts, of which there were only few indications to be found in medical literature, more especially as numerous papers soon afterwards appeared in British and foreign medi-

cal journals, describing cases of nervous disease showing the same origin. On reflecting about this matter I came to the conclusion that one reason why the number of neuroses, seen after grip, is so very largely in excess of those observed after other acute diseases, was that more than half the population of the country had latterly been down with influenza, while the number of patients suffering at any one period from other fevers, is always very much less. It soon, however, became evident to me that there was not only a greater number, but also a far greater variety in the nature and aspects of the nervous sequels of grip, than in those of other infectious fevers.

We all know the character of the post-febrile neuroses seen after such diseases as diphtheria, small-pox, and typhoid fever, to mention only some of them; and we are agreed that they run in comparatively narrow grooves. Thus we see local palsies arising from peripheral neuritis, and occasionally aphasia and hemiplegia, and certain diseases of the spinal cord, after typhoid fever. Again, we meet with paralysis and anæsthesia of the soft palate, paresis of accommodation, ophthalmoplegia, and what Dr. Guthrie[33] has recently called "bulbar crises," after diphtheria. But who has seen such different diseases as optic neuritis, optic atrophy, supra and infra-orbital neuralgia, embolism of the central artery of the retina, spasmodic torticollis, tetany and tetanus, stammering and hysteria, astasia and abasia,

diabetes and tachycardia, after small-pox? Or who has met with agoraphobia and catalepsy, Jacksonian epilepsy and Graves's disease, chorea and angina pectoris, unilateral and bilateral paralysis of the portio dura, general paralysis of the insane, melancholia, and other psychoses, after diphtheria? Yet all these and other nervous affections have been observed as direct and unmistakable sequels of influenza; and I have therefore no hesitation in stating that there are few disorders or diseases of the nervous system which are not liable to occur as consequences of grip, and that as a powerful etiological factor of protean forms of nerve-disease, influenza stands *facile princeps* amongst all infectious fevers.

The only distemper which approaches grip in this particular quality is *syphilis*, which may also give rise to the symptoms of almost any nervous disease with which we are acquainted. I find a still further analogy between these two infectious diseases in the circumstance that in both we may have a primary attack, secondary symptoms of a comparatively mild character soon afterwards, and tertiary affections of a more dangerous and obstinate nature, affecting the organic structure of tissues at a more remote period.

Influenza also appears in a number of cases to revive an old syphilitic infection which has been dormant in the system for years, and thus indirectly to give rise to certain

diseases of the spinal cord, which are known to occur habitually on a syphilitic base. In comparing the degree of virulence of the two poisons, however, I have found that, when the grippo-toxine attacks the structure of organs, it often does so with far greater ferocity, and in a more ruthless manner than the syphilitic virus. Thus we sometimes see incurable blindness from optic atrophy established within a few days of the outbreak of the feverish attack of influenza, while, when the same affection is owing to syphilis, its course is generally protracted over years, and it is also more amenable to treatment. Again, I have seen spastic paralysis, when owing to grip, striking the patient down with one fell blow; while the same disease, when owing to syphilis, is slow in development, and apt to be arrested in its progress, and improved in its symptoms by therapeutics. Finally I have known general paralysis of the insane to come on, after an attack of grip, in men who had previously been perfectly well, to destroy the patient's physical and mental powers, and to end fatally within a few months; while when owing to syphilis, I have seen the course of the same disease extending over six or seven years. In almost all neuroses which occur on a syphilitic base, we have a reasonable chance of doing good by treatment, while organic brain or cord affections consequent upon influenza, seem sometimes to be utterly incurable from the first.

When I had once realised this extraordinary tendency of grip to be followed by nervous sequels of almost any description, it was only a short step to the further enquiry whether the chief reason of this peculiarity might not be found, independently of the great prevalence of the parent disease, in the circumstance that the distemper itself, in its primary manifestations, is not so much an infectious catarrhal fever, as has been generally assumed, as an infectious *nervous fever?* A clinical survey of the symptoms of the feverish attack rendered this *primâ facie* not unlikely, as many of them point unmistakably to the nervous system as the starting-point. Such signs are a peculiar kind of fever, severe headache and back-ache, neuralgic pain in the body and limbs, utter prostration of mental and bodily strength, and insomnia, to which in many cases are added delirium, coma, convulsions, paralysis, deafness, loss of smell and taste, etc., while, on the other hand, catarrh of the mucous membranes and inflammation of the lungs have been completely absent in a large proportion of cases. Indeed, many patients have had influenza badly, without having once coughed or sneezed. Again where catarrh and pneumonia were present, these have frequently assumed such a peculiar character as to lead to the suspicion that they might likewise arise from irritation of, or loss of power in, the various nervous mechanisms supplying the affected parts, and would therefore have to

be looked upon more as vasomotor and trophic neuroses than ordinary catarrh and inflammation.

With regard to this latter point, it is interesting to note that Graves,[34] the greatest master whom the Dublin school has produced, had already, as far back as 1833, expressed his conviction that the poison of influenza acted on the nervous system in general, and on the pulmonary nerves in particular. In many bad cases of bronchitis and pneumonia accompanying influenza, Graves had found the dyspnœa to be intermittent, and undergoing remarkable exacerbations and remissions at certain hours of the day and night, rendering it likely that the affection of the bronchial tubes and lungs was of a nervous character.

"In influenza" (Graves says) "the dyspnœa is not always proportioned to the bronchitic affection; in some cases the difficulty of breathing was most urgent, although the air entered into all parts of the lungs with facility, and where few and unimportant râles existed. Again, although the presence of a copious viscid secretion in the bronchial tubes was sure to aggravate dyspnœa, yet it often occurred in patients whose air-passages were very little, or not at all, obstructed in this way."

Graves mentions, in connection with this, "the case of a fine young woman for whom everything had been done which the best and most skilful practice could

devise, but her condition, when he saw her, was desperate, and she died the following day; yet her chest sounded well on percussion, and we could hear nothing over the whole lung, except a few sonorous and sibilous râles; and the respiratory murmur seemed everywhere nearly as loud as natural. Of course such a lesion of the nervous influence could not last long without necessarily inducing pulmonary congestion—an inevitable consequence of imperfect aeration of the blood."

The great varieties observed in the symptoms of the feverish attack of grip, in the recent, as well as in the older epidemics of it, have induced a number of observers to assume three different forms of the disease, viz. :—

1st. The nervous or encephalic form;

2nd. The catarrhal, respiratory, or thoracic form; and

3rd. The gastro-intestinal or abdominal form of grip.

We have good descriptions of these different forms from the pens of Brochin,[35] Leyden,[36] Bidon,[37] and others; and a computation made by collecting a large number of cases, which have occurred during the recent epidemics in the practice of a number of observers, would appear to show that 55 per cent. belonged to the so-called nervous form, 30 per cent. to the catarrhal form, and 15 per cent. to the gastric form.

I wish, however, to lay particular stress on what I am convinced to be the fact, viz., that these three forms of the disease are not distinguished from one another by

any true pathological characters, but *that influenza is always a true nervous fever*, the symptoms of which differ only as far as the localisation of grippo-toxine in different areas of the nervous system is concerned. Indeed it would be quite as easy to propose eight or ten different forms of the disease as the three which I have just mentioned, and which are perfectly arbitrary, however much sanctioned by authority. Being guided by the principle of localisation, I contend that the first or nervous form is that in which we have to do with the effects of the grippo-toxine upon the thermolytic, cardiac, and other centres in the medulla oblongata or bulb; that in the second or catarrhal form, the special nervous mechanisms formed by the fifth pair and the pneumogastric nerves, which supply the mucous membranes of the eyes, the frontal sinuses, the nose, pharynx and larynx, the trachea, bronchial tubes and lungs, are suffering; and that finally in the third, the gastro-intestinal or abdominal form, the symptoms are owing to poisoning of those portions of the nuclei and branches of the pneumogastric nerves which supply the abdominal viscera, with occasional extension of the shock to the sphere of the splanchnic nerves which form a vasomotor centre for the whole abdominal cavity, and anastomose with the pneumogastric in the cœliac plexus. The argument which I will now endeavour to lay before you as concisely as possible, is at first sight supported by

the clinical fact which has been frequently observed, that the three forms just mentioned are found to overlap and to be intermingled with each other, some of the symptoms peculiar to one form being seen in another, or one form gradually merging into the other as the disease progresses, showing that it is utterly futile to draw any strict line of demarcation between them. Indeed, what might be called "pure" cases of any of these three forms are exceedingly rare, and close observation of *all* the symptoms which are present in an individual case will generally show that the several forms of it are mixed up together, however prominent one or the other sign may be. If I, therefore, still adhere to that division, I do so simply for the sake of convenience in analysing the different groups of symptoms, and referring them to different areas in the nervous centres.

1.—*Nervous Form.*

One of the most important symptoms of this form is the fever, which shows considerable peculiarities. But before discussing this, let me ask the question: Are there any apyretic cases of influenza? This is a difficult question to answer in a positive manner; yet we have probably all seen, at the time of the epidemic which we have recently passed through, affecting as it did thousands of persons in our vicinity, a good many people who, without being actually laid up with definite symptoms of grip, yet seemed to some extent to be under the influ-

ence of the poison, as shown by such symptoms as general languor and depression, utter want of interest in what was going on, insomnia, headache and back-ache, constipation of the bowels, flatulence, etc. Sometimes there has been, as Sherman Bigg[38] has recently pointed out, such unendurable despondency as to make the patient feel that death was preferable to the state in which he found himself, and suicide the only means of relief. The sufferer knows that he is ill, and should fight against the suicidal tendency, but appears to lack the power to do so. There is no irritability of temper, the patient being too apathetic to get excited or much annoyed about anything. I have seen such a case in a member of our own profession where the patient made three determined attempts on his life, each of which succeeded as nearly as possible. I have also seen a peculiar form of neuralgia, coming on quite gradually, without any apparent cause, affecting chiefly the supra-orbital and infra-orbital nerves, the brachial plexus, and the sciatic, that is to say, just the very nervous areas in which the grippo-toxine loves to localise itself, either in the attack or during convalescence. I have also known the lightning pains and other symptoms of tabes to be considerably aggravated, causing the patients to make themselves drunk with alcohol or morphine, in order to find relief. In connection with this I may allude to a singular observation made in the Deaf and Dumb Institution in Copenhagen,

where the pupils have been regularly weighed daily for the last seven years, and where it was found that the increase of body-weight, which habitually takes place during the months of November and December, did not occur in 1889, when influenza raged in the Danish capital. Yet none of the pupils had had grip, while six of the professors were ill with it, and may on their return to work have brought some germs of the disease into the place, and thereby depressed the vital powers of the pupils. I am inclined to ascribe all these singular occurrences to a *chronic infection of the nervous system with grippo-toxine*, which may occasionally, although no feverish attack has taken place, entail serious consequences upon those affected by it.

To return, however, to the consideration of the *fever* in grip. The rise of temperature is generally sudden, coming on without any warning, running up to something between 100° and 103° within a few hours, and being accompanied with chilly feelings, "cold water flowing down the back," or regular rigors, followed by, or alternating with, heat. Cases, however, are not uncommon in which a much higher degree of fever is reached. Many practitioners have seen 106°, and I have heard of a case in which the illness began with coma and a temperature of 108°; the day after the body-heat was normal, and the patient practically well. A patient who consulted me lately for nervous sequels of grip

informed me that she had had for two days a temperature of 109°, yet the nerve-trouble from which she suffered afterwards was of a mild character. I mention these cases in order to show that there is no invariable relation between the degree of fever and the severity of the illness, as is the case in the eruptive fevers and other acute diseases, and that a high temperature in grip is not always an unfavourable sign in a prognostic point of view. All of you must have seen cases of grip in which the temperature, however high at first, fell to the normal standard in less than twenty-four hours, with proportionate relief of the more distressing symptoms. Such a sudden fall of temperature has often been ascribed to some doses of antipyrin or phenacetin, which had been given during the stage of pyrexia, but it has likewise occurred in numerous cases where neither antipyretics nor any other drugs had been administered.

Cases of hyperpyrexia, with fatal results however, have been observed in the late epidemics of grip. Gibson[39] mentions the case of a boy, aged 10, who had, when first seen, a temperature of 105·4°. He complained of severe headache and back-ache, and being sore all over. In spite of treatment by antipyretics, the temperature rose to 107·4°, and eventually to 109°. The boy died. An uncle of his had died a year before from influenza in twelve hours, with a temperature of 108°.

Another case, seen by the same observer, was that of a woman, aged 27, who fell ill with the usual signs of influenza, and went on pretty well until the third day, when the temperature was 105°. In spite of treatment it gradually rose to 109°, and a fatal issue took place. In another case it rose to 109·6°, with the same result. In a fifth case, where the temperature was 105°, and kept rising, the cold bath was given, and in half-an-hour it had fallen to 96°. The patient recovered. Paramore[40] mentioned, in the discussion which took place on Influenza before the Medical Society of London, on December 14, 1891, a case in which the temperature rose to 111° before death.

In uncomplicated cases and otherwise healthy adults, however, the fever rarely lasts longer than one, two, or three days. It shows no definite type, as for instance in typhoid fever, but an extraordinary degree of mobility, being inclined to be irregular and intermittent. Thus it often falls in the evening and rises in the morning. Where there is a persistent rise, or considerable fluctuations in it, after the second or third day, this is owing to unfavourable complications, or to the subjects being aged or weakly, or affected with pre-existing laryngeal, pulmonary, or renal affections. In such cases, therefore, the thermometer becomes an instrument of the greatest diagnostic and prognostic importance.

How is the fever to be explained by the neurotic

theory of grip? This question is not easy to answer, because physiologists and pathologists are not yet agreed about a point of the first importance in the theory of fever, viz., whether the increased temperature is owing to increased *production* of heat, or to diminished *loss* of it, that is, increased retention. At the present time most pathologists are in favour of the former alternative, and hold that the fever-heat is due to increased production of heat, this being caused by irritation of the thermo-genetic centre which Eulenburg and Landois, Ott, Hale White,[41] and others have shown to reside in the corpus striatum, or, more strictly speaking, the caudate nucleus. This grey centre is known to control the oxidising metabolism which is constantly going on in the substance of the voluntary muscles, which constitute indeed the laboratory where the body-heat is produced. In the caudate nucleus there is a double nervous mechanism which in health acts harmoniously together, one set of nerves being excitor, or catabolic, while the other is inhibitory, regulating, or anabolic. Now it is assumed that in fever the excitor nerves are unduly active, causing excessive destructive metabolism, while the inhibitory nerves are paralysed, and unable to exert their controlling function. Macalister[42] indeed states quite plainly that the fever-heat is due, not to continuously diminished discharge, but to greatly increased production of heat.

I have long been of opinion that the opposite conten-

tion, first put forward by Traube,[43] of Berlin, in 1863, is nearer the truth, viz., that the fever-heat is not owing to increased production, but to *increased retention of heat.* Traube referred pointedly to such symptoms as rigors, the pale and cold skin, the subjective feeling of chill which is experienced where the thermometer has already shown a rise, etc. This theory has quite recently received considerable support from the experiments of Rosenthal,[44] of Erlangen, who caused fever in cats by hypodermic injections of such substances as pyocyanine,* an infusion of hay, tubercular sputum, and others. He then produced a rapid fall of temperature by injections of antipyrin, and used in his researches a highly sensitive air-calorimeter. Rosenthal has arrived at the conclusion that in the first stage of fever, when the temperature begins and continues to rise, the increased heat is invariably due to increased retention, and not to overproduction. When the fever is at its height, there appears to be a difference with regard to different kinds of fever, but in a number of cases the heat is, in this stage likewise, owing to increased retention. Finally, in the stage of defervescence, he has found that the loss of heat by the skin and lungs was enormously increased, and that the degree of this loss corresponded very closely to the fall of temperature which was observed.

* Pyocyanine is a sterilised solidified pure culture of the bacillus pyocyaneus.

Assuming these experiments, which appear to have been most carefully made, to be correct, I would explain the fever-heat in grip, not by irritation of the thermogenetic centre in the caudate nucleus, but by congestion of the thermolytic centre in the medulla oblongata, upon which the grippo-toxine acts as an irritant poison. This centre regulates the loss of heat which is constantly taking place through the skin and lungs, and includes for this purpose the vaso-constrictor centre which controls the action of the blood-vessels of the skin, the sudoriparous centre which presides over the action of the sweat-glands, and the respiratory centre which regulates the movements of the lungs (Hale White[41]). There are centres for all these organs and functions in the entire extent of the spinal cord, but the head-centre, if I may borrow that expression from Fenianism, is for one and all in the bulb. The question might be asked whether the thermotaxic centre, which is intended to adjust the balance between the two centres of heat-production and heat-loss, has any special connection with the fever of grip? This centre, which appears from the most recent researches of Ott, to be situated in the tuber cinereum, in the anterior part of the floor of the third ventricle, is more complex, and evolved at a later period, and is for this reason more easily put out of gear than the two other centres. I do not, however, see any reason to believe that it plays any considerable part in the production of the fever of grip, which

seems to be more satisfactorily explained by the morbid irritation and congestion of the thermolytic centre in the bulb. As long as this centre continues to be irritated by the grippo-toxine circulating in the blood, the fever continues; but as soon as so much anti-toxine has been formed in the serum as is required for neutralising the action of the toxine, there is a crisis, with a sudden fall of temperature, profuse diaphoresis, loss of heat through the skin and lungs, tendency to sleep, and relief of other symptoms. This crisis is occasionally accompanied with a scarlatina-like rash on the face, body and limbs, while the urine, which during the feverish attack has been scanty and highly charged with lithates, becomes clear and more abundant.

As in some other febrile diseases, it is noticed in grip that those cases do best in which a tolerably high fever is followed by profuse perspiration and sudden loss of heat, while others, in which the fever has a protracted course and terminates by lysis rather than crisis, are more likely to have a tedious and prolonged convalescence, and to be followed by severe complications and sequels. In this latter class of cases, we may suppose that an insufficient quantity of anti-toxine has been formed in the serum, with the result that the pathogenous bacillus is not rendered innocuous, but allowed to continue its mischievous career in the system.

I have just referred the fever of grip to *congestion* of

the thermolytic centre in the bulb. Indeed, no one who has watched and considered the clinical symptoms of the feverish attack of grip will deny that congestion must be looked upon as the principal pathological process which is at work during that time in the system. It is true that the symptoms are often so severe as to indicate *primâ facie* inflammation. More especially in children, influenza not unfrequently begins with what looks like symptoms of meningitis. There is intense headache, vomiting, constipation, grinding of teeth, rigidity of the neck, convulsions, delirium, and coma. In some cases the child becomes unconscious so suddenly that it looks like a stroke of apoplexy; yet the sudden defervescence of the most alarming signs, which is noticed sometimes twenty-four or thirty-six hours after their commencement, renders it certain that there can have been no inflammation or effusion, as these require a much longer time for resolution or absorption. Thus Piggott[45] has related the case of a boy of about 2 years of age, who suddenly developed a temperature of about 105°, with a pulse of 140; there was complete unconsciousness with stertorous breathing; the conjunctivæ were suffused, and the conjunctival reflex was absent. In the evening of the same day the temperature and pulse fell considerably; the child recovered consciousness, but was very restless. Next morning the temperature and pulse had become normal, and the little patient was practically well.

What else but a severe degree of congestion of the cerebral blood-vessels could have given rise to such a train of symptoms? We know that congestion is liable to very sudden modifications and variations under the influence of various agents, or after the cessation of certain causes. This opinion gains considerable support from the fact that in cases which looked like meningitis, a sudden improvement has often ensued in consequence of profuse epistaxis setting in. Moreover, we actually *see* congestion in that suffusion of the conjunctivæ and swelling of the eyelids which are almost invariably met with in grip.

Inflammation, however, does occur in various organs in particularly severe cases of influenza, when the irritation of the vaso-constrictor centre in the bulb and its peripheral ramifications by the grippo-toxine reaches a very high degree. That such is really the case has not unfrequently been verified by post-mortem inspection. Meningitis and meningo-myelitis have been seen by Mackay,[46] Bäumler,[47] Leyden,[36] Maillart,[48] and others. Bristowe[49] has described two cases of cerebral abscess following influenza, in which that lesion was verified by post-mortem examination, and has seen three other similar cases which ended fatally, and where the symptoms were such as to suggest that cerebral suppuration had supervened. Inflammation of all the structures of the eyes have been seen by a number of competent

observers, more especially in France and Germany, and in this country by Macnamara,[50] who drew attention to cases of double optic neuritis after influenza in his opening address at the section of Ophthalmology, during the last meeting of the British Medical Association at Bournemouth. There are also records of cases of glossitis, otitis, peritonitis, thyroiditis, endo- and myo-carditis, nephritis, orchitis, and other forms of inflammation in connection with grip, owing probably to migration of the bacilli of grip into the substance of those organs, where, in consequence of some peculiar predisposition or idiosyncrasy on the part of the persons affected, they multiply with preference, and cause extreme irritation of the vasomotor nerves, leading to inflammation. The occurrence of some of the more specific inflammations, such as erysipelas and pneumonia, in which other special bacteria are known to be the exciting agents, is however more probably owing to the circumstance that the power of phagocytosis is lost in consequence of the illness, and that those bacteria which in health are habitually destroyed by the leucocytes whenever they make their appearance at the entrance-gates of the system—*quærentes quem devorent*—are then readily admitted and allowed to multiply in the blood, when they will cause their own specific inflammations.

Next to the fever the most common symptom in the nervous form of grip is *headache*, which comes on sud-

denly, and is often at once so intolerably severe that the patient instinctively seeks his bed. It is no ordinary headache, but most violent and persisting, and generally accompanied with giddiness. The pain is habitually localised in the frontal region and the orbit, or the temples; sometimes however it is occipital, or extends all over the head. When affecting the orbit, any movement of the eyes causes extreme suffering. The pain is sometimes of a dull and heavy character, but is more frequently described as stabbing, throbbing, bursting, racking, or as if blows were being dealt with a hammer. It is generally combined with hyperæsthesia of the skin of the head and neck, and aggravated by contact, pressure, or movements. The pain is continuous, but apt to be worse at night, and generally lasts two or three days; yet it may continue for two or three weeks, and more. The patient feels at the same time dazed and confused, and is unable to think or to talk.

I consider the headache to be owing, in the majority of instances, to congestion of the membranes of the brain and of the sensitive portions of the cerebral substance. Where the headache is particularly intense and prolonged, it may be due to inflammation of the parts just mentioned. In Bristowe's[49] two cases of cerebral abscess which I have already mentioned, intense and constant headache, which lasted throughout the course of the illness, was one of the principal symptoms.

Where the pain is unilateral and of the neuralgic type, with tenderness of certain points in the anatomical distribution of the affected nerves, I assume it to be owing to neuritis, or to a high degree of congestion of the peri-neurium of the fifth nerve. In some cases it appears to be seated more in the muscular substance, for instance, of the occipito-frontalis or the ocular muscles, and may then arise from myositis or congestion of the muscular fibres. Finally, when occurring in the catarrhal form, it may be owing to severe catarrh of the frontal sinuses.

Headache is often associated with *back-ache*, affecting more particularly the loins, and may be so severe that, taken in conjunction with the high fever, suspicion is excited that the patient may be in the premonitory stage of small-pox. There is also habitually stiffness and soreness of the whole body, and pain in the hips and thighs, all of them being aggravated by movement. The pain in the limbs is often most severe, as if all the bones were broken, reminding us of the break-bone or *Abu-Rakaba* of dengue. Tremor, twitches, jerkings, cramps, and torticollis may also be present. The patient either lies in a death-like stillness, in order to avoid any increase of pain by movement, or he is so restless and uncomfortable that he keeps constantly tossing about or changing his position.

Independently of these pains, we often meet with a

more definitely neuralgic pain, following the anatomical distribution of certain of the spinal nerves, which latter may be found tender on pressure throughout their course. If the intercostal nerves suffer, there is, in addition to the pain and tenderness, a feeling of tightness and constriction of the chest, oppression and anxiety. The breasts, testicles, and coccyx have also been found to be the seat of neuralgia. In the upper extremities the median and musculo-spiral nerve are apt to suffer in the same way, while the ulnar nerve is spared. In the lower limbs, the sciatic nerve is often similarly affected. Together with this there may be great hyperæsthesia of the skin, muscles or bones.

All these different pains in the body and limbs may be traced to congestion or inflammation of the spinal membranes, and the sensitive portion of the substance of the cord, that is, the posterior columns and the posterior grey cornua, as well as of certain peripheral spinal nerves, which have just been mentioned.

Delirium is frequent in the febrile stage of influenza, and sometimes consequent upon the headache, where this is very severe. The patient is then literally driven mad with pain. In other cases the delirium is by itself the chief symptom which overshadows all the other signs of the attack, and may precede, accompany or follow any of them. It may, indeed, be the first symptom of the illness before the temperature of the

blood has risen, or the heart's action has become accelerated.

An interesting case of this kind has been recorded by Ewald.[51] A boy, aged 7, appeared to be in his usual health, when one morning, instead of going to school, he went to a railway-station and took a seat in a carriage, saying that he intended to go to Leipzig, where his father lived. He was removed from the train, but appeared to have forgotten his name and address. He was eventually taken home and appeared then quite wild. Fever and other signs of influenza presently supervened, and the boy continued delirious for several days. A crisis then occurred, and he recovered his mental balance.*

Kisch mentions the case of a servant-girl, aged 21, who had been perfectly well, and suddenly began to scream and talk nonsense, which went on the whole night. The next day influenza declared itself, when she became quieter, and was quite well again in four days. In other cases the delirium lasts much longer, and is generally of a violent character; the patient is apprehensive of being murdered, wants to jump out of the window, or fight those who approach him, or sings and prays incessantly.

* This boy has been, curiously enough, changed into a girl by Leledy,[52] who speaks of him as "une petite fille," and employs the terms "elle" and "la" throughout the relation of the case.

Joffroy[53] relates a case in which influenza commenced with delirium or maniacal excitement, with total loss of memory. The patient did not recognise anybody, believed his most intimate friends to be strangers, and had lost all recollection of his previous life. Sometimes he appeared to be dumb, at other times he sang snatches of music hall songs, and wanted to get out of bed to go to business. He also was apprehensive of being murdered; and his speech was affected as in general paralysis. On the eighteenth day the delirium and fever ceased simultaneously, the memory and reason quickly returned, and three weeks afterwards the patient, being then perfectly well, could return to business.

Gwynne[54] mentions that in Sheffield during the epidemic of the spring of 1891, a servant leapt from a window on the day she was seized with the disorder; she sustained a fracture of the leg, and was admitted to the General Infirmary, where she succumbed. Another instance was that of a medical man, who also threw himself out of a high window, with a less serious result than in the other case. He had suffered from influenza, and had been overdone by the hard work occasioned by the epidemic.

Creagh[55] has described a case of suicidal tendency during an attack of influenza, in which the patient had a temperature varying from 101·5° to 104°. On the fourth day of the illness he conversed rationally, and

showed no signs of lightheadedness or delirium, nor was there a history of any previous similar attack. In the afternoon of the same day, however, the patient not only cut his throat with a carving-knife, inflicting a gash about two inches and a-half across the throat, but also fractured his skull in two places by striking himself with the claw end of a heavy hammer. He nearly died from shock and hæmorrhage, but rallied somewhat on the following day. There was, however, delirium, which increased so much in the evening that he had to be restrained with handcuffs. He continued delirious for another night and day, and then rallied, and made an uninterrupted recovery.

In the alcoholic, grip may prove the exciting cause of *delirium tremens*. It has been a matter of common notoriety that during the late epidemics of influenza, cases of delirium tremens have been unusually frequent. We have then the ordinary signs of this condition, more especially the terrifying delusions, superadded to the signs of grip. It assumes however a somewhat different character from that which it usually has, for it lasts habitually longer, and may go on for eight or ten days, while the ordinary form of it generally lasts only three or four days. Moreover, the ordinary form almost invariably gets well, unless there should be a complication with pneumonia, erysipelas, meningitis, or injury to the head, while the alcoholic delirium of grip often proves

fatal. Van Deventer[55] had three deaths in ten such cases, and Revilliod[56] saw one in which death ensued on the tenth day of the illness, and where the post-mortem showed an effusion of sub-arachnoid serum.

Delirium also occurs in the so-called respiratory form of grip, together with bronchitis, broncho-pneumonia, and pneumonia. Now we do not see delirium with ordinary bronchitis; and when it occurs in pneumonia, it is generally towards the end, about the sixth day, and when the patient is in a typhoid state. We then see muttering delirium, which persists to the end; while in grip delirium is usually of a violent character, and may come on quite in the beginning of the pneumonia, and when there is as yet little or no consolidation of lung-tissue. It also occurs in the gastro-intestinal form of grip; and it has been noticed by the superintendents of asylums that, during the recent influenza epidemics, the number of admissions of cases of delirium and mania was altogether about treble of what it was in ordinary times.

In other cases the mental disturbance assumes more the form of depression and melancholia. The patient refuses food, which he sometimes believes to be poisoned; is in a state of profound apathy, and expresses weariness of life. In most of these cases there is persistent insomnia, or when sleep is obtained, it is short, unrefreshing, and disturbed by distressing dreams. After a

week or two, however, the temperature falls, the excitement subsides, and the melancholia clears up; and there is eventually total forgetfulness of all that has happened. Unless complications be present, such as alcoholism, pneumonia, etc., the febrile psychosis does not leave any mark behind; and it must not be confounded with the psychoses which are apt to occur during convalescence from grip after the fever has subsided, and which will be considered when I speak of the complications and sequels of influenza.

While delirium may therefore be the most prominent symptom of some cases of grip, that disease in other instances commences and ends with somnolence and *coma*. Aikman[57] has described the case of a working man who got up in the morning to go to his work as gardener. He did not care for his breakfast, felt ill, but started for his work. Before he had gone far he returned home, and threw himself on his bed; when seen he appeared comatose, showed his tongue when asked, but could not be persuaded to open his eyes or to answer questions. His temperature was 102°, the pulse 100, and his skin dusky and flushed. This state lasted for two days, during which he ate nothing and drank little. At the end of that time he roused up quite suddenly, answered questions in a weary way, but without an attempt to move; his pulse was 60, and his temperature 97°. He recovered with no other sign but

a rattling at the base of the lungs, such as one hears in the first few long breaths taken by aged and bedridden people. Macphail[57a] has seen two somewhat similar cases. One of these patients was an old woman, who had been apparently quite well before, and who was sitting at supper about midnight eating and talking heartily, when she suddenly fell from her chair to the floor unconscious. She revived spontaneously, but relapsed suddenly, and was then brought round again by hot applications. Before morning the usual symptoms of influenza had developed.

NONA.

This seems to be the proper occasion to speak about the peculiar complaint Nona, of which the public press gave some sensational accounts during the late influenza epidemics.

It was stated that, more especially in the North of Italy and Switzerland, numbers of persons were taken with a new disease called Nona, which consisted of invincible sleepiness during or after an attack of influenza, and that this lethargy was followed by death in three or four days. A correspondent of the *British Medical Journal* has suggested that the true reading should be "Nonna," which, literally translated, means "grandmother," but is also used to signify "old woman" or

"witch." With regard to this there is a legend in Russia, the North of Italy, and other countries, that when a witch approaches the bedside of a sick person, and succeeds in touching the patient with her finger, his death is certain; on the other hand, if she fails in doing so, the patient is sure to get well. Without entrenching further on this aspect of the matter, I will mention the cases which have been reported, under the heading of Nona, by Braun, Tranjen, Hallager, and Gillet de Grandmont.

Braun[58] relates the case of a girl, aged 14, who had been in perfect health, and suddenly fell ill with severe fever and violent headache. The same evening as well as the following days, the parents noticed that the girl, who had usually shown a bright and lively disposition, was taken with extreme somnolence. Indeed, she slept almost without interruption. When roused, she stared at people as if she were quite absent-minded, did not answer questions, and did not know her friends. When a cupful of milk was handed to her, and she was asked to drink, she took a few mouthfuls, after which the eyes closed, she dropped the cup, and fell asleep again. The doctor first saw her three days after the beginning of the illness, when fast asleep; she did not put out her tongue when requested to do so, and only muttered some inarticulate sounds. The pupils were dilated, and responded sluggishly and imperfectly to light. The

complexion and the colour of the lips were strongly cyanosed. The tongue was dry, and showed a black fur. Respiration was regular, but accelerated; the pulse regular, 110. There was high fever and profuse sweating. The excreta had been passed in the bed. There was some rigidity of the neck. Any movement of the head, but more especially bending it forward, appeared to be painful, and caused slight sobbing. There was no paralysis, but an extensive and firm hepatisation of the lower and middle lobe of the right lung. There had also been vomiting and constipation.

It was therefore clear that the girl suffered from pneumonia and probably also from cerebro-spinal meningitis; and it was evidently owing to the somnolent condition in which the girl was that there was no cough or pain in the chest; in fact, besides rapid breathing and cyanosis, there were only the physical symptoms of pneumonia, which allowed its presence to be ascertained. The next day the temperature was 104·6°; the pulse 108, regular; the sweating had ceased. There was evidence of resolution in the lung, while the symptoms of meningitis remained unchanged. The rigidity of the neck was indeed more pronounced. During the next two days the condition became more critical, convulsive seizures followed one another rapidly, and the child died on the sixth day of the illness. An autopsy could not be obtained.

The case was peculiar by the simultaneous occurrence of pneumonia and meningitis, and it appeared probable that they were owing to the same morbid poison. Braun has known of two other cases of meningitis which happened about the same time, but has never seen meningitis occurring in this peculiar and exceptional manner with prolonged somnolence, and considers both diseases owing to the poison of influenza.

Tranjen,[59] a Bulgarian practitioner, has described the following cases :—

A child, aged 2, with a healthy history, had, when first seen by him, been asleep for about three weeks. Occasionally it moaned and put its hands to its head. It could be easily awakened, and awoke occasionally of itself, asking in inarticulate sounds for water. After this it immediately dropped asleep again, but woke for passing water and motions. The head was slightly retracted, the pupils equal, dilated, and sluggish. The tongue had a white fur, the abdomen was retracted. There was no rash; the spleen was not enlarged; there were no signs of organic disease; the temperature was 101·2°; pulse and respiration were normal. This condition lasted sixteen days longer, when the coma deepened, and a fatal issue occurred two days afterwards.

The second case was that of a girl aged 10, anæmic and thin, who died with similar symptoms after an illness of seven days. She was reported to have been

very clever. She had grip in January, and was ill with it for three weeks. She then became somnolent; the head and abdomen were retracted, the tongue furred, the pupils unequal, dilated and sluggish; she often awoke, drank a little water, caressed and kissed her mother, and then went to sleep again immediately. She never said a word or asked for anything, but woke in order to pass her water. Shortly before death there was slight trismus. The temperature did not rise beyond 100·4°, and the pulse and respiration were normal.

A third case was that of a soldier, who died after ten days' illness with the same symptoms. The autopsy showed a high degree of hyperæmia of the cerebral membranes, and œdema of the brain, but no effusion.

Tranjen considers these to be cases of infectious cerebro-spinal meningitis on a grippal base, which was however peculiar, inasmuch as it caused no symptoms of motor irritation or paralysis, but simply somnolence. The sleep was indeed very much the same as ordinary physiological sleep.

Another author who has written on this subject is Hallager[60] (Viborg) who relates the case of a servant-girl, aged 16¼, of good health, and coming from a good stock, who had grip about Christmas, 1889. She recovered well from this, but began about six months afterwards to complain of lassitude and sleepiness, with pain in the right shoulder and breast. One day she

complained of headache, and could not eat anything, and the day after she slept almost the whole time. The next morning she was found fast asleep, and could not be awakened by shouting to her; she hardly moved on pinching her arm and leg. When her eyes were forcibly opened, they were found to be turned upwards, and the pupils dilated. The tendon reflexes were normal. There were thirty respirations, the pulse was 128, and the temperature 102°. She was taken up and put into a carriage, and driven about for some time, afterwards carried up into her bedroom, undressed and put to bed, all without waking her. Shortly afterwards she opened her eyes, drank a little milk, and went off to sleep again. The urine was then drawn off, and she did not awake until about an hour after that, when she seemed quite herself, and complained of headache and pain in the right shoulder. The temperature was then found to be 103°. The next day she seemed quite well, the temperature being normal. The girl remained after this in good health, and appeared to be much more lively than she had been before her sleeping bout.

Gillet de Grandmont[62] relates the case of a young woman who, after an attack of grip, fell into a semi-comatose condition, was unable to open her eyes, and showed a semi-paralytic condition of her limbs. She complained of a deep-seated headache, and felt certain that her end was approaching. The eyelids drooped,

the pupils were slightly dilated and sluggish, and the eyes were in a state of complete ophthalmoplegia. There was congestive pupillitis, and a tortuous condition of the retinal veins. An application of leeches had a favourable effect on this condition. De Grandmont thinks from this case that what has been described as Nona may sometimes be external ophthalmoplegia coming on after influenza.

The delirium and insomnia which are observed during the feverish attack of grip must be considered as owing to congestion of the cortex of the brain, whereby the grey matter is irritated; while somnolence and coma must be referred to a more severe degree of congestion, whereby the brain-matter is actually compressed. Where the congestion affects the central convolutions of the motor area of the brain, we meet with convulsions or paralysis, which are chiefly seen in children. Other symptoms of the feverish attack, such as subjective flashes of light, noises in the ears, giddiness, deafness, loss of smell and taste, numbness of the head and face, etc., may also be accounted for by congestion or inflammation of the different nerves involved.

The last set of symptoms which may occur in the nervous variety of grip to which I have to draw your attention is a most serious one, inasmuch as they indicate imminent risk to life by sudden failure of power in the heart's action and in respiration. They are in fact cardiac and respiratory crises.

a. Cardiac crisis.—In some cases the patient complains of a constant feeling of giddiness, and faints away perhaps four or five times during the first day of the illness. The pulse is then either exceedingly frequent, small, and almost imperceptible, or it is slow, irregular, and intermittent. The face is pallid, the extremities are cold, and the skin is covered with a cold sweat. The patient appears, as it were, overwhelmed by the poison, which he has no power to eliminate. A similar state of things is sometimes observed in cholera, more especially in the beginning of an epidemic, in diphtheria, and in scarlet fever. In grip a patient may suddenly die of syncope before he has had time to react, or to develop pneumonia or meningitis. There may be no pain, but simply a feeling of deadly languor; he seems paralysed, gradually gets cold, and dies without a struggle. In other cases there may be præcordial pain, giddiness, and palpitations, followed by lethargy, stupor and death. Where the patient survives, the heart's action often remains unsatisfactory for weeks or months afterwards; the pulse may continue slow and irregular, or there is tachycardia with 240 or more beats in the minute. A simple change in the position of the head or the body, a slight effort, as when the patient is raised up in bed for examination, may even at a later period lead to a cardiac crisis, which requires the utmost vigilance on the part of the practitioner and the attendants to avert or to combat. In

some of these cases there is no change in the heart's structure, while in others a low form of myocarditis or endocarditis may be developed. Pawinski[62a] has shown that patients who have previous to the attack of grip suffered from heart disease, however slight, are more apt to be affected by cardiac crises than where the heart has been thoroughly healthy.

b. At other times a *respiratory crisis* may threaten the patient's life. Graves [34] had already drawn attention to a peculiar kind of dyspnœa, which is not justified or explained by any stethoscopic signs, and which he therefore referred to an affection of the nervous system. There may be the symptoms of spasm of the glottis, great pain in the chest, and a violent cough ; the breathing is hurried and difficult, and regular attacks of dyspnœa or orthopnœa recur at regular intervals. With all this there is no bronchitis or pneumonia. Ferrand has well remarked that there appears to be sometimes a kind of paralytic atelectasis of the lungs through loss of elasticity in the alveoles, and bronchial paralysis, as shown by feeble respiratory murmur in a portion of the lungs, exaggerated resonance, and increased vocal fremitus. Huchard,[63] who calls this condition *bronchioplegia*, mentions the case of a woman, 76 years old, who had a slight attack of influenza, during which she exposed herself to cold. The same evening she was taken with severe dyspnœa. There were a few slight

tracheal râles, but no fever, bronchitis, or congestion of the lungs. There was however progressive cyanosis and asphyxia, of which she died in a week.

To these symptoms another interesting sign may be added, viz., polyuria, and an extreme excess of phosphates in the urine. There may indeed be a kind of phosphatic diabetes, resulting probably from the rapid break-up of the phosphorus contained in the nervous structures.

The cardiac and respiratory crises which I have just described point so clearly to an affection of the cardiac and respiratory centres in the bulb, that I should be carrying owls to Athens if I were to insist on this self-evident explanation.

2. *Catarrhal Form of Influenza.*

I now proceed to speak of the second variety of grip, viz., the so-called catarrhal, respiratory or thoracic form, which I consider to be owing to irritation of the nervous mechanisms formed by the nuclei of the fifth and pneumogastric nerves in the bulb.

The peculiar feature of this variety is that we have in addition to the fever and other symptoms all the signs of catarrh affecting more or less the whole extent of the mucous membranes of the respiratory tract, viz., the frontal sinuses, the lachrymal glands and ducts, the conjunctivæ, the maxillary sinuses, the pharynx, Eustachian tube and cavity of the tympanum, the larynx, trachea

and bronchial tubes, together with congestion of the lungs or broncho-pneumonia. In some of these cases there is much irritation and congestion, but only little catarrh, the principal symptom being a most severe and peculiarly harsh, hacking cough. This cough is extremely violent and irrepressible, accompanied by soreness and pain behind the sternum, and occurs in regular paroxysms, like whooping-cough, leaving the patient utterly exhausted. There is not necessarily any expectoration, the cough being sometimes quite dry, while in other instances there is a glairy yellow or grey sputum. This cough may persist a long time after all the other symptoms have disappeared. In most cases however there is a profuse discharge from all parts of the mucous membrane, more especially from the naso-pharynx, which is at first serous or sero-sanguinolent, and subsequently becomes purulent. The tonsils may slough away; there may be angina and aphonia, so that the patient is only able to whisper. This may be followed by œdema of the glottis, when the dyspnœa is intense, the breathing hurried, the facial expression anxious, and the accessory muscles of inspiration are seen to work as hard as possible.

This catarrh of the upper portion of the air-passages may be the first symptom of the attack, or it may come on in cases where the patient has had a mild attack of the nervous variety, and neglected himself by going out

too soon, exposing himself to cold, and attending to his business.

It will be seen from this description that the grippo-catarrh of the upper portion of the respiratory organs differs considerably from ordinary catarrh affecting those membranes. In grip the inflammation extends to the frontal and maxillary sinuses, the conjunctivæ, lachrymal glands and ducts, pharynx, Eustachian tube and tympanic cavity, which does not habitually occur in ordinary catarrh. Moreover in grip the serous or sero-sanguinolent flow from the naso-pharynx is more profuse. There is generally headache, nausea, vomiting, and all or some of the symptoms of the nervous variety, such as vertigo, general hyperæsthesia, stupor, melancholia, insomnia and delirium, while the expression of the face denotes a greater degree of suffering than exists in ordinary catarrh.

The *bronchitis* of grip is also of a peculiar character and different from ordinary bronchitis.

It may become developed at any time, but is less frequent in the beginning than about the fourth or fifth day, and may be still later in making its appearance. It is often very rapidly developed, and accompanied by a peculiar pain behind the sternum, and difficulty of breathing, which is out of proportion to the physical signs. When there is hardly any rhonchus or sibilus, the patient may breathe forty or fifty times in the minute, and seem on the point of being choked, while next day he may be

a great deal better or apparently well. The bronchial congestion may, however, gradually merge into catarrhal or even capillary bronchitis, and is then apt to last very long, being accompanied by a more distressing and obstinate cough, and a more profuse purulent expectoration than takes place in ordinary bronchitis.

In such cases the temperature may remain for days at 103° or 104°, and the physical signs become gradually well developed, there being harsh respiratory murmur, with rhonchus and sibilus, and mucous râles over the bases of both lungs. The prostration gradually becomes still more marked, the dyspnœa more intense, and the patient eventually dies of asphyxia, or utter exhaustion.

These differences are also strikingly marked in the peculiar form of *pneumonia* which is apt to accompany or to follow influenza. It is true that we meet also with ordinary croupous pneumonia in these cases, when Fraenkel's diplococcus is found in the sputum from the beginning of the illness up to the crisis, but not afterwards. This form of pneumonia, however, I believe to be only indirectly connected with grip. The system being enfeebled by the invasion of an irritant poison loses its power of resistance, or to speak more definitely, of phagocytosis, and offers a favourable soil for the development and multiplication of the pneumo-coccus and other bacteria which are always present in the fluids of

the mouth, and ready to invade the lungs when the entrance-door is no longer barred to them.

In such cases we generally find a fresh rise of temperature about the fourth or fifth day; the patient complains of pain in the side, the breathing becomes shallow, there are suspicious movements of the alæ nasi, the pulse goes up to 100 or 120; the cough is troublesome, and there may be rusty sputum. The disease is more protracted in its course than usual, less likely to be terminated by a favourable crisis, and attended by more prostration; and occasionally a patient seems in a fair way of recovery, when fresh febrile disturbance arises, the other lung is found to be attacked, and a fatal issue is the rule.

There is, however, another form of catarrhal pneumonia which is peculiar to grip, and resembles more the hypostatic and congestive form which we see in other fevers, although it has features of its own which distinguish it even from the latter. Bacteriological research has shown that in this form it is not so much Fraenkel's diplococcus as the streptococcus pyogenes and the staphylococcus aureus which infest the sputum. The affection may begin as early as the second or third day, but comes on more frequently between the fifth and eighth day, and in the nervous variety of grip almost as frequently as in the respiratory form. The patient seems often in a fair way of recovery when this insidious

form of broncho-pneumonia begins, sometimes with a fresh rise in the temperature. It often occurs after undue exposure to cold, or when the patient has prematurely resumed his ordinary occupation.

Forsyth[64] states that he has seen cases in which the fever appears to have two distinct periods, the former of which runs its course in three or four days, leaving the patient comparatively well so far as his own sensations and expectations go, and then comes the fifth day, when something else happens. The patient is not so well as yesterday, nothing strongly marked, the headache has come on again, or backache is more troublesome, all so slight as not to be worth the name of a relapse. But it is a relapse—a very insidious and dangerous relapse—for it ushers in the most fatal stage of the disease, with coryza, cough, bronchitis, congestion and œdema of the lungs, and suffocation.

Simon[65] has drawn attention to the circumstance that in many cases, after apparent recovery from the feverish attack, there may be heard at one or both bases of the lungs some very sticky crepitant *râles* on inspiration, which from the absence of symptoms pointing to lung complications may be easily overlooked. Anyhow the patient seems to get weaker instead of stronger; he has no regular rigor or shivering fits, but feels chilly, and is apt to perspire unduly. The temperature may be normal in the morning, but rises in the afternoon,

and may be 104° in the evening. The breathing may at first be easy, without cough or expectoration; but auscultation shows in a small place, perhaps not larger than a crown-piece, some crepitant râles, which sometimes change their place from day to day, there being less actual inflammation and hepatisation than congestion and catarrh. The breathing is therefore not so tubular as in ordinary pneumonia; there is no marked dulness, and what there is may vary from day to day.

Sometimes no breath-sounds can be heard over a large area. With all this there is no pain in the side, nor the peculiar rusty expectoration of ordinary pneumonia, the sputum being more sanguinolent and serous, not tenacious, while at other times it may be muco-purulent. The affection is often bilateral, but generally worse on one side. The disease gradually creeps on over a more extensive area of lung-tissue; there is now cough and dyspnœa, pain in the chest, and the expectoration becomes more profuse, being a sort of bloody foam. We also find total loss of appetite, distension of the abdomen, and fœtid diarrhœa. The heart's action is interfered with, the pulse getting unduly quick, irregular, and intermittent. There is much quiet delirium, and the patient is in a typhoid condition. Diaphragmatic pleurisy often occurs together with this peculiar form of pneumonia, and albuminuria is not uncommon. The

affection usually lasts from two to six weeks, and death is either preceded by somnolence and coma and Cheyne-Stokes's respiration, or more sudden, by loss of cardiac power and syncope. The alcoholic, the diabetic, the phthisical, and others affected with pre-existing organic disease, as well as those who exhaust themselves by work or the pursuit of pleasure, and the aged, are chiefly apt to succumb. When the patient recovers, convalescence is generally extremely tedious, and often incomplete. I have known patients to look twenty years older after such an attack, and to have permanently lost all the energy and freshness which formerly distinguished them.

Pleurisy is not very commonly observed under these circumstances; but Mitchell Bruce[66] has seen an unusual number of cases of empyema after the epidemic of 1890 had spent itself, some of them peculiarly severe, foul, and quickly perforating inwardly; and Nicholson[67] has also noticed that, when pleurisy occurs, the effusion is very apt to become purulent and form an empyema.

The differences which I have just pointed out as existing between the symptoms of ordinary catarrh and pneumonia on the one hand, and the corresponding processes as part and parcel of influenza on the other hand, are so striking that we are driven to look for the latter to a different etiological factor; and I contend that congestion or inflammation of the nerves supplying

the respiratory mucous membranes and lung-tissue brought about by the action of the grippo-toxine is the only cause which will satisfactorily account for the phenomena which we observe.

The nutrition and secretion of the upper portion of the air-passages, including the membranes of the eyes, are under the influence of the fifth pair of cranial nerves, which derives its trophic and secretory elements from its numerous anastomoses with the cervical sympathetic nerve. Experimental division of the fifth nerve is known to cause, in the first instance, circumscribed necrosis of the cornea, with detachment of epithelium and corneal corpuscles, whereby an opacity is produced. This necrotic patch then acts as an irritant, and leads to inflammation of the cornea, conjunctiva, and the other structures of the eye. Ulceration of the mouth, lips, tongue, and hard palate, is another consequence of section of the fifth. On the other hand, *irritation* of the fifth nerve, through neuritis or pressure of a tumour, gives rise to a great many other symptoms. I have described these fully in a paper read before the Royal Medical and Chirurgical Society in 1868, and published in its Transactions for 1869,[68] and which was based on a case of bilateral neuritis of the fifth nerve, which had then been under my care. Amongst the symptoms present in that case, only those apply to our present purpose which show the condition of the mucous membranes supplied

by that nerve. There was hypersecretion of conjunctival mucus, the cornea being covered with streaks and shreds of mucus, which gave a peculiar death-like appearance to the eyes. In the mucous membrane of the nose there was likewise hypersecretion, which had led to thick scabs filling up the nostrils, the mucus being so acrid that on running down to the lips it had made the skin of the sulcus naso-labialis and part of the lip beyond this sulcus quite sore, causing the moustache to fall out. There had also been great tendency to nasal hæmorrhage. In the mouth the hypersecretion of mucus was so excessive as to oblige the patient to have a pocket-handkerchief constantly applied to it, in order to prevent the liquid from running down the chin; and the lips appeared covered with froth, such as we see in a patient who is in an epileptic fit. There was also ulceration of the tongue and mouth, and tendency to hæmorrhage from the gums.

Irritation of the fifth nerve is therefore seen to give rise to catarrh of all the mucous membranes supplied by it; and I consider that the catarrh of the upper portion of the air-passages, which we see in the so-called catarrhal form of grip, is owing to irritation of that nerve by the grippo-toxine. The loss of smell and taste, which is so frequently noticed in these cases, is partly due to the same cause, as the altered secretion in the nasal fossæ does not allow the fibres of the olfactory nerve to be duly im-

pressed by odoriferous substances. The glossitis, which is sometimes seen in grip, has also a nervous origin ; for glossitis has been seen in severe cases of neuralgia of the fifth, where the congestion of the tongue is sometimes so severe that the organ is constantly kept protruded from the mouth. Eruptions of herpes zoster and sub-acute inflammation of the periosteum, parotitis, and other inflammatory affections, have likewise been observed, together with falling out of the teeth, glaucoma, and certain acute inflammations of the eye, of which I shall speak more fully in a subsequent chapter. I will therefore at present only say that the observations of Galezowski[69] and others on the keratitis of grip, show most plainly the neurotic origin of that inflammation, as the symptoms differ considerably from other forms of keratitis, and are almost identical with those described by Senftleben[70] many years ago as occurring after section of the fifth nerve. The keratitis of grip, being thus shown to be of a peculiar character, has also been found to require an entirely different treatment from that adopted in other forms of keratitis.

In the same way as the nutrition and secretion of the upper portion of the air-passages are under the influence of the fifth nerve, the nutrition and secretion of the lower portion of the tract, from the pharynx down to the lungs, are under the control of the vago-accessory nerve, which, like the fifth, has numerous anastomoses with the sym-

pathetic throughout its course. The peculiar hacking cough to which I have drawn attention, I would ascribe more especially to congestion or inflammation of the cough-centre in the bulb, which is connected with the larynx by the superior laryngeal nerve.

There are few points in experimental physiology which have been so carefully studied ever since the times of Valsalva and Morgagni down to the present day, as the lung affection which follows section of both vago-accessory nerves. Suffice it to say that the consequence of this proceeding in all animals, birds alone excepted, is broncho-pneumonia, as shown by hyperæmia of the mucous membranes, reddening of the lung-tissue, extensive serous effusion, turbidity and swelling of the epithelial cells, collapse of individual parts, more especially in the upper lobes, precipitates of crowds of white blood-corpuscles which have emigrated, and vesicular and vicariating emphysema. Paralysis of the vago-accessory nerves renders the glottis unable to close completely, and thus to separate the digestive from the respiratory tract, so that not only particles of food, but what is even more dangerous, the fluids of the mouth which always contain bacteria, enter the larynx and the lungs, and there act as excitors of inflammation. Death in three or four days is the inevitable result of division of these nerves in most animals, but the cause of death is as yet somewhat doubtful. It cannot well be the broncho-pneumonia

which kills, for birds die after the operation, although no lung-affection occurs in them; and it seems most probable that death is owing to a variety of troubles caused by the removal of so important and complex a nervous mechanism. Thus the complete cessation of the glycogenic function of the liver, which results from this operation, may contribute to the fatal result; and another cause is no doubt the gradual exhaustion of the respiratory centre in the bulb. The centripetal fibres of the vago-accessory nerves have a regulating influence on the respiratory centre; and this influence is suddenly removed by vagotomy. The consequence is that breathing becomes very much slower, the inspiration is rendered tetanic and the expiration active, thus entailing great muscular efforts. There is, therefore, a total change in the normal type of respiration, which leads in its turn to considerable alterations in the circulation of the blood. The work that has to be done by the bulb is rendered so much more difficult and laborious that we should naturally expect exhaustion to set in sooner or later; and this is what actually occurs in the later stages of the broncho-pneumonia of grip when the patient is unable to rally. Birds die after vagotomy in eight or ten days with the symptoms of inanition, and the heart, liver, stomach, and muscles are then found to have undergone fatty degeneration, showing plainly the influence of the pneumogastric nerve on the nutrition of those parts.

Let us now consider at what part of the course of the fifth and the pneumogastric nerves the irritant lesion produced in them by the grippo-toxine is situated. It seems to me evident that this lesion, whether congestive or inflammatory, must be very high up, as the symptoms generally implicate the whole extent of the area which is under the influence of these nerves. Moreover their simultaneous affection, which occurs in the catarrhal form of grip, would lead us to assume a locality where they are lying close together. The two pairs of nerves are in closest contact however in the uppermost portion of the spinal cord and bulb, where they originate with two nuclei, a smaller motor, and a larger sensitive one. The motor nuclei consist of small grey masses lying on the top of the anterior grey cornua of the cord, beneath the intermediary tract of the bulb, and in the middle stratum of the pons; while the sensitive nuclei are situated on the prolongation of the posterior grey cornua of the cord and the tubercle of Rolando, at the sides of the floor of the fourth ventricle. Irritation of this portion of the bulb is therefore shown to account for the symptoms observed in the catarrhal form of grip, just as irritation of the vasomotor and other centres in the bulb will account for the symptoms of the nervous variety of grip.

I have mentioned that in my case of bilateral neuritis of the fifth nerve, there was great tendency to hæmor-

rhage from the mucous membranes affected, particularly the nose and gums; and this observation leads me to consider another set of symptoms which is apt to occur in grip, and of which I have not yet spoken, viz., the *hæmorrhages* which may occur in various parts.

Wherever there is a high degree of congestion, this is apt to be followed by hæmorrhage, through bursting of the over-distended blood vessels; and seeing the all but universal prevalence of congestion in grip, it cannot be a matter of surprise that hæmorrhage in almost all organs of the body should have been frequently noticed during the attack of influenza. The observation to which I have just referred, however, shows the direct dependence of a hæmorrhagic tendency upon nerve irritation, and will thus aid us materially in understanding its occurrence in the cases under consideration.

The most frequent form of hæmorrhage in grip is undoubtedly epistaxis, which has by some observers been seen in thirty to thirty-five per cent. of their cases. Koranyi,[71] who has described the epidemic as it occurred in the pupils of the Honved Military Academy of Buda-Pesth, states that out of 141 lads 135 had grip, and that in 48 of these the disease began with epistaxis. Mosler[72] has seen it in fourteen cases, and it was alarming in two. Holz[73] has seen a case in which it was so obstinate that the patient, a vigorous young fellow, nearly died of it; and Nelson Gwynne[74] mentions

that it occurred in 18 out of 200 cases treated by him, while in a few of them it was so profuse as to necessitate plugging of the nares.

Ecchymosis of the conjunctiva has also been frequently seen, but this appears to have been generally owing rather to the strain induced by violent coughing, as in whooping-cough, than owing to internal irritation.

Bleeding has occurred from the gums and ears. Haug,[75] who has seen not less than eighty cases of inflammation of the ear arising from influenza, has in seventeen cases noticed hæmorrhage, which set in quite suddenly, and was accompanied with intolerable pain.

The membrana tympani appeared livid or even black, and had entirely lost its normal outline; on its surface were seen ecchymosis or bullæ filled with blood, which soon became ruptured. Hæmorrhage into the cavity of the tympanum was also frequent. Within six or twelve hours the membrane was ruptured, and fluid or clotted blood was discharged. Similar occurrences have been noticed by Habermann[76] and Politzer,[77] and Karwowski[78] has seen cases in which hæmorrhage from the external ear and from the bronchial tubes was the first symptom of grip. In one of these cases there was an immense amount of sanguinolent expectoration from the bronchial tubes, and only three days afterwards fever and other signs of grip supervened.

Hæmoptysis in persons previously quite healthy

has been far from uncommon. In patients affected with phthisis in different stages of the malady, the illness has often commenced with hæmorrhage and fever, and in one such case the attack of hæmoptysis proved fatal. Wilschur[79] has seen severe pulmonary hæmorrhage so frequently occurring when consumptive patients were attacked with influenza, that he looks upon grip as an agent having a peculiar influence in depressing the vital energy of lung-tissue through the instrumentality of the nerves. Hæmatemesis and bleeding from the bowels have likewise been observed amongst the viscera.

It is, however, chiefly the womb which is liable to suffer in this manner. Anton[80] states that women are particularly liable to get influenza at the time of the catamenial discharge, and Evershed[81] has made a similar observation. The menses have often occurred prematurely, and been extremely profuse. Peiper mentions three cases of a sudden return of menstruation where it had occurred only a week before. One of these women stated that she lost in a single day as much blood as at other times in several catamenial periods taken together. Metrorrhagia has also occurred as the first symptom of grip in wet-nurses, and in women who had for years ceased to menstruate. Miscarriage has occurred in the pregnant. Again hæmaturia has been seen as the initial symptom of grip, or has come on on the second or third day of the illness, not only

in persons who had previously suffered from kidney disease, but also in those who had been perfectly free from renal troubles before.

Purpura hæmorrhagica has been noticed by several observers, and Pick[82] has described a case of hæmorrhagic diathesis, which occurred in a youth, aged 19, who had been in perfect health before he was seized by grip. The symptoms were profuse epistaxis, hæmorrhage from the gums, hæmatemesis and bleeding from the bowel, hæmorrhage in the subcutaneous cellular tissue of the body and limbs, severe headache, coma, and paresis of the left side. The patient died, and the autopsy showed several small clots in the membranes of the brain, while the lateral ventricles, the Sylvian aqueduct, and the fourth ventricle, were distended with blood. In the right occipital lobe there was a cavity of the size of an orange, filled with blood and *débris* of tissue. Hæmorrhage was also found to have occurred into the pericardium, the cellular tissue of the pharynx, and the stomach.

Dück relates the case of a boy, aged 7, who fell ill in January, 1890, with shivering fits, vomiting and diarrhœa. The fever subsided, with diaphoresis, after two days. On the following night, however, the patient had a fit of apoplexy, became comatose, and died the next day. If we consider this in the light of the case which I have just mentioned, we may fairly conclude

that the boy died of cerebral hæmorrhage. It is clear that such a widely-spread hæmorrhagic tendency must have a central cause, which I contend to be the specific irritation of the vaso-constrictor centre in the bulb.

3. *Gastric Form of Influenza.*

In a large number of cases of grip, the digestive organs appear to escape the morbid influence. While the patient is extremely ill, restless, and in pain, the tongue may be clean, the appetite good, and the bowels regular. He readily takes his beef-tea, milk, and refreshing drinks, and as soon as the fever has subsided, develops the heartiest appetite. In other instances, however, we find the symptoms of gastric catarrh ; the tongue is dirty and slimy, and denuded of its epithelium, or red and dry. There is loss of appetite, thirst, nausea, tenderness in the epigastrium, and either constipation or diarrhœa. But it is not such comparatively mild cases which are considered to belong to the gastro-intestinal form of grip; indeed, the symptoms of this latter are far more severe. There are not only fever and headache, as in the other forms of the disease, but true gastric crises, such as we see them in locomotor ataxy. There is at first nausea and retching, and then violent and incessant vomiting of food, mucus, serum, bile, and blood. The quantity of vomit is much greater than can be accounted for by what the patient may have been eating or drinking. There is also gastric uneasiness,

cramp, and intense pain in the epigastrium and all over the abdomen. The vomiting is sometimes incessant, and everything that is taken is at once brought up again. During such a crisis the pulse is often slow, falling sometimes to thirty beats, or even less, in the minute.

In other cases the bowel may suffer severely, there being the symptoms of dysentery, or cholera. The patient is seized with violent colicky abdominal pain, and severe diarrhœa, with or without vomiting. He may have twenty or thirty motions during the day, the discharge being at first fœtid and bilious, while after a time nothing but mucus and blood are passed; or there may be the rice-water evacuations of cholera. The patient is voiceless and prostrate, has a choleraic aspect, and cramps in the legs. Sometimes there is complete paraplegia, and coma may be an early symptom. When the patient survives the attack, convalescence is exceedingly slow; there is extreme debility and emaciation; and digestion often remains impaired to such an extent that the least error in diet leads, weeks or months afterwards, to a return of gastric or intestinal disturbance. This intestinal form of influenza occurred in January and February, 1892, epidemically in Vienna, where it was at first supposed to be connected with the drinking water. This, however, had remained exactly the same as before, and it was a curious coincidence

that, as soon as this severe enteritis assumed an epidemic form, the ordinary type of influenza vanished.

R. Simon[84] has recorded some cases characterised by severe abdominal pain and collapse, which constitute a variety of the gastric form of influenza. One of these patients was a doctor who had been depressed by overwork, and began to feel tired and ill generally rather than complaining of any special aches or pains, when early one morning he awoke with severe pain in the abdomen, and hurried to the water-closet. There, after a copious motion, he so nearly fainted that he was obliged twice to lie down on the floor before he could complete his toilet and walk to his bedroom, where he lay for some time completely collapsed, sweating profusely, and almost pulseless. From this state of collapse he soon recovered, and was able to get up in the evening and out of the house next day, although for more than a fortnight he was exceedingly depressed in health and energy.

Another patient had nearly the same symptoms, viz., a fainting fit in the water-closet preceded by abdominal pain and followed by very marked collapse. His illness was not, however, so transitory, for during several days he was kept in bed by fever—the temperature rising to 102·5°—and general catarrh of the lungs.

A bicycle worker, aged 15, had felt out of health for three weeks and complained of abdominal pain, and one

morning while at work suddenly fainted. He was given some brandy, and brought at once to the hospital. On admission he was scarcely conscious, and so collapsed as to appear almost moribund. The temperature was 98°; the surface of the body was cold; the face of bluish tinge (but without sweating); the pulse was scarcely perceptible, and the respirations sighing and very infrequent—from 6 to 8 per minute—with pauses of five seconds or more between the end of expiration and the beginning of inspiration. With some difficulty it was made out that he had pain in the right side of the abdomen, mainly in the region of the cæcum, and in this region there was well-marked tenderness. After being put to bed and treated with hot bottles, poultices, etc., he quickly recovered, but some tenderness over the cæcum remained for a day or two. There was no rise of temperature. He left the hospital in four days, well but very weak. Severe depression followed in all these cases, but in only two of them was there any evidence of bronchial irritation.

The gastric crises which I have just described, coming on as they do without any other cause except the invasion of the system by the grippo-toxine, point most unmistakably to severe congestion of the vomiting centre in the bulb, which may be affected not only by irritation of the central end of the vagus, but also by that of many afferent fibres in the same nerve. Faradisation of

the central end of the vagus causes vomiting, and arrests urinary secretion. Indeed, the pneumogastric regulates not only the secretion of the gastric juice, but also the motility of the stomach, giving fibres to the mucous membrane as well as to the muscular coat of the viscus, besides which it presides over the glycogenic function of the liver, the action of the pancreas, and even that of the intestines. On the other hand, the whole vascular area of the abdominal cavity is likewise under the influence of the splanchnic nerves, which unite with the phrenic and right vago-accessory nerve to form the cœliac plexus, from which spring the phrenic, hepatic, splenic, mesenteric, renal, and other plexuses. It may thus be readily understood that a shock given to the nucleus of the vago-accessory nerve in the bulb may be transmitted to any one of the abdominal organs by the nervous path just indicated, and that it may cause more especially the intestinal crises of which I have just spoken.

A final symptom, which is almost invariably present in a greater or lesser degree, in all forms of grip, and continues well into the period of convalescence is *great prostration of mental and physical strength.* There is not nearly so much waste of tissue in the feverish attack of grip as in cases of typhoid and rheumatic fever, or of pneumonia; yet the loss of power is often far greater during and after a short attack of it than from the

diseases just mentioned. After the fever is over, the patient may feel tolerably well as long as he remains in bed; he is then anxious to get up, but when attempting it feels so giddy and exhausted that he again seeks the recumbent position. This debility is sometimes so great as almost to amount to paralysis. The pulse is generally of low tension, very compressible, and apt to become irregular in consequence of the slightest effort, such as sitting up in bed, etc. It may be too slow or too fast, according as there is irritation or paresis of the vago-accessory nerve, and is not rarely intermittent. Palpitations, præcordial pain and fainting are then not uncommon, and sudden death by cardioplegia may take place. In such cases the autopsy may not show anything to account for such an event, while in some cases a slight degree of myocarditis has been discovered, which was, however, insufficient to explain the fatal result. The latter is thus evidently owing to sudden failure of power of the cardiac centre in the bulb.

This extraordinary degree of prostration, which is characteristic of grip, has arrested the attention of the earliest observers, whose descriptions are collected in Thompson's[85] "Annals of Influenza." Huxham,[86] Gray,[87] Hamilton,[88] and many others have simply registered the fact that the exhaustion of the patient suffering from grip has been found to be out of proportion to the strength and duration of the fever, but they have not

attempted any explanation of it. It seems to me, however, easily accounted for, by the theory that the poison of grip attacks with preference the very sources of life—Flourens' *noeud vital*—viz., the cardiac and respiratory centres in the bulb ; and this localisation of the poison makes it intelligible why the whole system and constitution of a person is often thoroughly shaken and as it were revolutionised by such an attack. Let us compare the sudden prostration felt on the very first day of grip with the state of things in the beginning of typhoid fever, where the patient often simply feels out of sorts, and is astonished when the doctor orders him to bed. In influenza, on the contrary, the patient instinctively seeks the bed at once, without waiting for the doctor's orders, as he feels it useless to battle against the disease.

Loss of energy and incapacity for work with and after grip, are chiefly marked in the anæmic, the neurotic, the consumptive, and in persons who have overworked themselves, or become debilitated by intemperate living, anxiety, and other influences which tend to lower the power of resistance of the nervous system. It is, however, generally found, for some weeks after the attack is over, even in those who were quite well and strong previous to the invasion of the compaint.

J. Mackenzie[89] asserts that the late epidemics of grip have not only had a deteriorating effect on the health of the people in general, but that there has been a similar

influence on the post-influenzal offspring, viz., an excess in the number of premature births, and imperfect development of the fœtus.

Having thus traced the immense variety of symptoms occurring in the feverish attack of the different forms of influenza to irritant poisoning of the bulb and the nerve nuclei contained in it, one other question only remains for me to answer, viz.: Why should the grippo-toxine tend to attack with preference the parts I have mentioned? To that question I can only reply by pointing to analogous facts which have long been known, showing the existence of elective affinities of other poisons to other portions of the nervous system. Let me remind you that ergot of rye attacks with preference the posterior columns of the spinal cord, while lathyrus cicera lays hold in a similar manner of the lateral columns, and lead seeks out the anterior grey cornua of the same organ. With such striking instances before us, it may appear less surprising that the grippo-toxine should select for its point of attack another strictly circumscribed portion of the nervous system, the integrity of which we know to be of the first importance for the various phenomena of life.

In concluding this chapter it remains for me to state that the support of my theory of grip which has thus far been afforded to it by morbid anatomy, is somewhat scanty. This is, in my opinion, partly owing to the fact

that only comparatively few autopsies of gripped patients have been reported, and partly to the circumstance that the brain has not always been carefully examined. Where gripped patients have, for instance, died of pneumonia, I have in a number of instances only found a record of the condition of the thoracic and abdominal organs. It may also be assumed that in some cases the congestion which ushered in the attack, and persisted while the disease was at its acme, may have subsided during the final stage of depression which precedes death.

An important series of autopsies, tending to confirm the theory which I have brought forward, is given in the report of an epidemic in the Danish asylum of Aarhus, by Helweg.[90] In eleven carefully performed post-mortem examinations, there was found a most intense hyperæmia of the pia mater and brain, such as is never seen in any other cases; and this was more particularly marked in the arteries at the base of the brain, which were filled with blood to bursting, and stood out as cylindrical cords, as if they had been injected with wax. The consistence of the brain and spinal cord was increased; in four cases there was also a fresh pachymeningitis, and in one case a fresh lepto-meningitis. This would seem to show that the hyperæmia of grip is a process tending to produce inflammation, the latter, however, becoming only fully

developed in particularly suitable cases. A relationship is thus fund to exist between grip and the epidemic form of cerebro-spinal meningitis.

There were 520 inmates in the Asylum of Aarhus, of of whom 41 had a severe attack of grip. The following is a table of the results found in the eleven fatal cases:—

Dura mater	Hyperæmia	In 4	cases.
	Inflammation	„ 4	„
Pia mater	Hyperæmia	„ 11	„
	Inflammation	„ 1	„
Brain	Hyperæmia	„ 11	„
	Increased consistency	„ 10	„
Lungs	Hyperæmia and œdema	„ 9	„
	Inflammation	„ 5	„
Pleura	Serous effusion	„ 3	„
	Fibrinous „	„ 2	„
	Purulent „	„ 1	„
Pericardium	Serous effusion	„ 2	„
	Purulent „	„ 2	„
Peritoneum	Serous effusion	„ 1	„
Stomach	Acute catarrh	„ 5	„
Intestines	„	„ 4	„
Spleen	Swollen and soft	„ 5	„
Kidneys	Parenchymatous degeneration	„ 8	„
	Inflammation	„ 1	„

Goodall[91] has given an entirely different record of thirteen cases which proved fatal in the West Riding Asylum at Wakefield, the patients having died of influenza and its pulmonary complications. His results

are as follows:—1. The arteries at the base are described as "healthy," "normal," and "atheromatous"; there is no mention of congestion. He thinks it quite improbable that congestion in a remarkable degree should have escaped notice and record. 2. In two cases the "internal membranes" are described as "congested," in one as "perhaps congested." In two others it is stated that the pia contained but little blood. In the remaining cases the lepto-meninges were either normal or showed the changes of chronic brain disease (thickening, opacity). As regards hyperæmia of the brain itself, one case showed "much injection of grey and white matter throughout," and "the internal capsules were notably injected." In another the grey matter was "slightly congested." In a third the white matter was "congested in the posterior part of the brain." In two other cases the brain is described as "pale." In the remaining cases the colour was the average. 3. There is no note of increase in consistence in any of the cases; in nine the brain is said to have been of "reduced consistence." 4. No pachy- or lepto-meningitis in any of the cases.

Maillart's[98] observations made in the Cantonal Hospital of Geneva during the late epidemic agree in the main with those of Helweg. In nine cases out of twelve the brain was examined, and lesions were found in each. In the first case there was in the right hemisphere of the cerebellum great hyperæmia, hæmorrhagic spots, and

complete softening of the medullary substance. Microscopic examination showed that the coats of the arterioles and venules of this part were in a state of fatty degeneration. In the second case there was found copious sub-arachnoid hæmorrhage at the base of the brain, chiefly in the middle fossæ. On taking the brain out, the hæmorrhage was found to spread into the upper portion of the medullary canal, and to proceed from an aneurism of the basilar artery, which was of the size of a pea, and had become ruptured at its antero-inferior surface. There was some liquid blood in the right lateral ventricle and granular ependymitis. In the third case the dura mater was completely adherent to the bones, and the pia mater slightly thickened and strongly congested. In the fourth case, there was acute non-suppurating lepto-meningitis; the pia mater showed strong œdematous infiltration at the convexity as well as at the base; the vessels were turgescent. In three other cases where the patients had been consumptive, and had died of a rapid progress of the tuberculosis subsequently to the attack of grip, the condition of the brain is not mentioned. In the eighth case there was hæmorrhagic pachy-meningitis, chiefly in the sphenoid fossæ. In the ninth case there was general sub-arachnoid œdema. In the tenth case, which was that of a tubercular and alcoholised person, there was strong sub-arachnoid œdema. The left sylvian artery was surrounded

by a loose non-transparent tissue, and there were numerous miliary tubercles in its tract. On the right side the same lesions were found, but not so pronounced. There were no tubercles on the convexity, but a few on the blood-vessels of the anterior surface of the pons. There was internal hydrocephalus. In the eleventh case, where the patient died of coxo-femoral arthritis and psoas-abscess after grip, there was found slight sub-arachnoid œdema and lepto-meningitis with hyperæmia. In the twelfth case, where the patient died of grippal suppurating pneumonia, the pia mater was found covered with a compact layer of greenish thick and ropy pus on its whole surface, base as well as convexity; it was strongly œdematous. On opening the brain the lateral ventricles were found to be full of the same kind of pus as was found on the pia.

It is, therefore, seen that in every one of Maillart's cases, just as in Helweg's, in which notes of the condition of the brain were taken, definite lesions were found, implicating either the membranes, or the blood-vessels, or the substance of the brain. These results are specially significant when it is remembered that the cases recorded were not those of inmates of an asylum, but of persons indiscriminately admitted from outside for severe forms of grip into a general hospital.*

* See Postscript at end of volume.

CHAPTER III.

THE COMPLICATIONS AND SEQUELS OF INFLUENZA.

I SHALL consider the complications and sequels of grip, as affecting the different organs of the body, together, as otherwise endless repetitions would be required. To give only one instance, numerous diseases of the eye have been seen both as complications during the attack and the period of convalescence, and as sequels after the patient had apparently quite recovered. I have endeavoured to ascertain the proportion of cases in which there have been complications and sequels, and am inclined to think that they have occurred in about twenty per cent. of the persons affected. Owing, however, to the absence of detailed information in many instances, I would give this proportion with all due reserve.

A most important question to consider in connection with this subject is, whether the complications and sequels of grip are owing to constitutional faults and individual predisposition of the patients who have been affected by them, and whether grip has therefore simply

been the *exciting cause* of these troubles; or whether they have occurred without inherited and acquired predisposition in persons who were, previous to the feverish attack, in perfect health, and had no important family history, when the attack of grip by itself must appear to have been the *determining* or *pathogenic* cause of these affections. I shall discuss this question in the first section of this chapter when treating of the post-grippal psychoses, and will therefore now simply state the general result at which I have arrived, and which is to the effect, that in the majority of instances where peculiar complications and sequels arose, a constitutional predisposition to special diseases has been found to exist, while in an important minority of cases the grippo-toxine alone must be held responsible for the exceptional troubles which have been observed.

I now proceed to describe these processes as they have been found to affect the different organs of the body.

A.—Post-Grippal Psychoses.

I have already spoken of the delirium which sometimes precedes and at other times accompanies the feverish attack (p. 38). This form of mental disturbance is generally temporary, and ceases with the fever, without leaving the patient apparently much the worse for its occurrence. Yet such cases may end fatally in

nervous subjects. Peter (quoted by Miropolsky[120]) has observed the case of a lady who was highly nervous, and had had a great deal of trouble shortly before she was taken with grip. On the fourth day of the attack she was suddenly taken with mania, incessant agitation, and insomnia. The temperature was only 100·4°, and could therefore not cause this condition. The tongue was dry, the pulse 128; she was chattering incessantly on all kinds of subjects, and died of exhaustion two days afterwards. Again, in the alcoholic, the feverish attack of grip may lead to the outbreak of delirium tremens, which has in some instances proved fatal. Van Deventer[105] has reported three such cases. One of them was a man aged 46, who had been drinking heavily, and had six years ago an attack of pleuro-pneumonia, and two years ago one of erysipelas. On the third day of each of these illnesses he had had an epileptic fit, followed by the symptoms of delirium tremens. He caught influenza, on the next day had two epileptic seizures, and then developed delirium tremens. He became extremely restless, had terrifying hallucinations, and was in a state of furious excitement. The heart's action presently became very irregular, and on the sixth day he succumbed from failure of cardiac power. Another patient died on the fourth day of the illness, and a third six weeks afterwards.

I now proceed to speak of a more important class of cases, viz., of those where mental disturbance occurs

after the fever has subsided, and when the patient has entered or passed the period of convalescence.

Although post-grippal psychoses have probably occurred in previous epidemics, proper attention has only been given to them after those visitations which we have recently passed through. Thus we find hardly anything worthy of note concerning them in Thompson's[85] "Annals of Influenza," or the works of Schweich,[92] Kusnezow and Hermann,[93] and others. Kraepelin,[94] who has written an excellent paper on the influence of acute diseases in the causation of mental affections, published in 1881 and 1882, has entered fully into the different forms of insanity observed after intermittent and rheumatic fever, pneumonia and pleurisy, the acute exanthemata, erysipelas, typhoid fever and cholera, but has not said a word on psychoses subsequent to influenza. The same observer has, however, more recently[95] written a short but interesting article on some cases which have been under his care after the epidemic of 1889 to 1890; while we have further contributions to the same subject by Becker,[96] Pick,[97] Rosenbach,[98] Joffroy,[99] Pons,[100] Bartels,[101] Schmitz,[102] Kirn,[103] Drasche,[104] Van Deventer,[105] Metz,[106] Brakenridge,[107] Snell,[108] Ladame,[109] Mispelbaum,[110] Bidon,[111] Mairet,[112] Leledy,[113] Savage[114] and others.

I will now shortly relate some cases of this kind

which have been under my care, and then discuss the pathogenesis of these affections.

CASE I.—*Neurasthenia and Hypochondriasis.*

A single woman, aged 35, had influenza in March, 1890. Until then she had enjoyed excellent health, and her family history was unimportant. I first saw her in May of the same year, when she complained that ever since her attack she had been unable to attend to her occupation, which was that of a housekeeper. She had lost all confidence and nervous power, cried for no cause, could not sleep, or if she did so, was troubled with distressing dreams, from which she awoke in a state of terror. She had lost her appetite, suffered from a most wearying feeling of pressure on the top of the head, and was constantly in a state of the greatest despondency. On attempting to do anything she had a sensation as if her brain were moving about in her head, together with such throbbing as to excite the apprehension of an impending fit. Indeed she felt sure that she had incurable brain-disease.

Percussion of the cranium sent a strong thrill through her body; the knee-jerk and other reflexes were much exaggerated. The fundus oculi was normal, the pulse feeble and irregular, 108; the tongue furred, the temperature sub-normal, the urine had a density of 1004, and was very feebly acid. I prescribed sulphonal at bed-

time, and aconite liniment to the head, hydro-bromate of quinine with strychnine three times daily, and a much more nourishing and digestible diet than the patient had hitherto had. She was much improved in a fortnight, and in about three months was well enough to resume her occupation.

Case II.—*Melancholia.*

A young lady, aged 19, was brought to me in April, 1890, by her mother, who informed me that ever since the girl had had influenza, six weeks ago, an extraordinary change in her temper had taken place. While formerly she had been of a cheerful and energetic disposition, and interested in a great variety of things, she had now become sullen in her behaviour, and disinclined for work or conversation. When requested to do anything, she either took no notice, or said she could not do it; she sat generally in a chair all day long, staring before her. She refused to go out or to eat, and would sometimes sit up all night. She often said that she was lost and could not be saved. Her previous history was good, as she never ailed anything except measles and whooping-cough, and the family antecedents were also satisfactory. Both parents were alive and well, and there were six other children, all in good health. The catamenia of the patient had appeared

when she was fourteen years of age, and had ever since been regular and unattended with discomfort.

The patient had a dogged expression, answered questions not at all or in a perfunctory manner, and appeared to have a difficulty in articulating. The fundus of the eye was normal, the knee-jerk exaggerated, and the muscular power feeble, the dynamometer showing only 35° on the right and 20° on the left side. The tongue was furred, the temperature sub-normal, and the pulse of low tension, and beating at 128. The urine had a density of 1005, was neutral, and contained an excess of phosphates. The bowels were extremely sluggish, acting only every four or five days. I prescribed digitalis, quinine, phosphide of zinc, and aperients, and advised removal of the patient into different surroundings. For about a month after my first interview with her she remained in very much the same condition; an improvement then became manifest, and in four months after the first appearance of the symptoms she had quite recovered.

Case III.—*Delirium of Inanition.*

A clerk in an accountant's office, aged 26, single, was brought to me by his father in May, 1891. I was informed that the patient had always been quite well and strong, had never had a day's illness, was steady in his habits, and a hard-working, clever man, who had

gained the confidence of his employers. He had never had syphilis.

In April last he had a severe attack of influenza, which confined him to his bed for a week; he insisted, however, on getting up and going to the office before his doctor had given him permission, being over-anxious to resume his occupation. His employers, noticing that he seemed very feeble and ill, wished him to go to the country to recruit his strength; but the patient said he was quite well enough to work. His fellow-clerks, however, noticed at once that he was quite a different man; he dawdled over his work, did not seem to understand what he was about, spoke in a foolish manner, and made mistakes in letters and accounts. It was noticed that his bed-room, which he formerly used to keep very tidy, was in a fearful state of disorder, all his things being thrown pell-mell about the floor. When walking in the streets he swayed about and behaved so strangely that he was several times on the point of being given into charge of the police. He ate practically nothing all this time, and could not sleep. The next day he appeared to be worse; seemed to have lost his memory altogether, accused his fellow-clerks of robbing their employers, said that there were too many cats and dogs about the place, and expressed a fear that he was going to be prosecuted for perjury. The night afterwards he got out of bed about 2 a.m., and ran to the office, where he created a

great disturbance, calling for the police, and shouting that there were thieves in the place. He was brought to me about 10 a.m. the same day, as his people did not know what to do with him. The patient gave a most confused account of what had happened to him during the last few days, was very excited, and asked his father repeatedly not to speak so loud, as he did not wish people to know that he was in my house. There was utter incoherence of ideas. When asked to write his name and address and the date of the month, he made several glaring mistakes. During the interview with me he was constantly getting up, walking about the room and sitting down again. His tongue was furred, his breath had a peculiarly offensive odour, the pulse was 140 and extremely feeble, the temperature sub-normal, and he nearly fainted away twice during the interview.

I gave him at once a hypodermic injection of morphine, and prescribed sulphonal at bed-time, ammonium bromide, with digitalis and nux vomica three times a day, and a highly nourishing and easily digestible diet, with four ounces of brandy in the twenty-four hours. Three days afterwards the patient had improved so much that he was fit to be taken to the country where he remained for three months. He made a gradual and satisfactory recovery, and when I saw him last in October, 1891, he had been quite well and had regularly attended to his work during the last six weeks.

CASE IV.—*Homicidal Impulses.*

A broker, aged 33, married, and father of five children, first consulted me in 1880, about hypochrondriacal feelings from which he suffered. Under the influence of treatment he improved, and remained fairly well until four years afterwards, when he had a more severe attack of melancholia, apparently without any particular cause. After about twelve months, however, the patient's mind gradually brightened up, he again began to take an interest in life, and resumed business with considerable vigour. He now remained quite free from any mental trouble until December, 1889, when he had a bad attack of grip, with high fever, severe headache and persistent insomnia. He came to see me in February 1890, and had hardly entered my room when he burst out crying and said that he was in a dreadful condition, as he constantly felt an almost irresistible impulse to kill his wife and children, and kept praying all day and night that he might not do so. He was often obliged to rush out of the room at meal times, because the sight of knives on the table made him feel as if he were compelled to cut his wife's and children's throats. He was unable to attend to his business, suffered from giddiness and loss of sleep, and had great pain and tenderness in the cranium and the upper portion of the spine. The pulse was feeble, 112, and the temperature 99·8°. There

was no appetite, and the bowels were confined, the urine was neutral, 1008, and contained an excess of phosphates. As the patient had on former occasions derived marked benefit from the use of electricity, I gave him at once an application of the constant current to the head, 2 M.A.'s for the præ-frontal lobes, five minutes, 1 M.A. to cervical sympathetic and bulb, one minute each side. He felt greatly relieved and soothed by this application, and I therefore repeated it on the three following days. I also prescribed strychnine with bromide of ammonium, and an alterative pill at bed-time. Under the influence of this treatment the patient rapidly recovered his mental balance, and appeared to be quite well again about six weeks afterwards. I heard from him a short time ago to the effect that his health had since that time been satisfactory.

CASE V.—*General Paralysis of the Insane. Fatal Issue.*

In October, 1891, I saw in consultation with Dr. Brookfield, of Kilburn, a merchant, aged 52, married and father of three children, who had been perfectly well until January, 1890, when he had an attack of grip. He recovered well from this and did not seem to suffer in any way from the effects of it. In April, 1891, he had a second attack, with which he was laid up for three

weeks. When he got up again, it was noticed that a great change had taken place in his general condition. He had lost all interest in his business, was indifferent to his family, was disinclined to talk, and only wanted to be left alone. He likewise showed difficulty in walking, standing, and the use of his hands. He often seemed to be quite absent and silly. In August last he had an attack of left hemiplegia, and after that he deteriorated still more rapidly. When I saw him he had for many days been in a state of coma, from which he rallied occasionally, soon to relapse again into it. He was then quite paralysed, unable to move a limb or even to put out his tongue, and had neurolytic bronchitis with râles all over his chest, sixty-four inspirations, a pulse of 134, and a temperature of 103·5°. He was in effect in articulo mortis, and died a few hours after my visit.

CASE VI.—*Incipient General Paralysis of the Insane. Recovery.*

In October last I saw in consultation with Dr. Montagu Miller, a merchant, aged 51, married and father of three children, who had been in good health until he had influenza in April, 1891. He had never had syphilis, and always lived temperately. He had no catarrh with the grip, but simply nervous symptoms. Ever since then he had not been the same man that he was before, as he had lapses of memory, worried over trifling matters

of business which had formerly left him quite unconcerned, and took undue trouble with things that did not require his attention. He had recently had some domestic trouble, to which, however, he did not appear to attach much importance. About ten days ago he was suddenly taken with epileptiform seizures, affecting one side of the body and accompanied with short losses of consciousness. He seemed confused, slept either very heavily or not at all, and had lost power in the arms and legs.

During my interview with him he was highly emotional, being several times unable to restrain his tears. His memory was much affected, as he had a difficulty in telling me his age. His manner was altogether peculiar. Cranial percussion did not show any localised tenderness, but he complained of headache, and peculiarly heavy feelings in his head. He told me that when he had attempted to attend to business, he became so excited and confused that he was unable to go on with it. He had great difficulty in composing letters, which were written in a curiously round-about and unbusiness-like style. The discs were normal. There was awkwardness in the use of his fingers, but the muscular force, as measured by the dynamometer, was fairly good, 110° left, and 140° right hand. What attracted particular attention, however, was a curiously shuffling gait, which had only been noticed during the last few days, and

which was exactly like that seen in some forms of general paralysis. He had great difficulty in raising his feet from the ground, and walked by pushing one foot after another along the floor. The knee-jerk was exaggerated on both sides; and eliciting it in the ordinary manner and without any undue force, sent such a thrill through the whole body that the patient very nearly fainted away, and had to be laid flat on a couch. He said that it resounded all through his head, and he trembled all over, more especially with his right hand, for about five minutes.

I advised perfect rest, change of scene, and mercury with large doses of iodide of potassium. Under the influence of this treatment the patient improved wonderfully, and when I saw him again about a month afterwards, most of the symptoms above related had disappeared. Eliciting the knee-jerk, however, still caused a startling effect; the patient felt queer all over, had a sort of spasm in his throat, and shook like a leaf; and this effect lasted nearly three days. Since then he has made such good progress as to enable him to resume his business.

The cases which I have just related may naturally be grouped into four separate classes, viz., 1st, neurasthenia, hypochondriasis, and melancholia; 2nd, acute asthenic delirium, delirium of collapse, or as I prefer to call it, delirium of inanition; 3rd, mental affections grafted

upon pre-existing neuroses; and 4th, general paralysis of the insane. Kraepelin,[95] Ladame,[109] and others have distinguished only three different groups, much on the same lines as the three first mentioned; but the cases of general paralysis which I have related do not fit into any of these categories, and require an extension of the classification hitherto proposed.

I. The first and apparently most frequent class is that of which Cases 1 and 2 are instances, and may be characterised as simple mental depression, ranging from ordinary neurasthenia to the more severe forms of hypochondriasis, melancholia and depressive insanity. The patient is incapacitated from attending to his ordinary occupations, and falls into a gloomy habit of thought, in which dark forebodings of some impending disaster, the apprehension of an incurable disease, which is about to carry him off, or the delusion that he has committed some fearful crime, for which he is going to be imprisoned, tried and executed, play a leading part. He considers himself disgraced or financially ruined, contemplates suicide as the only escape from his imaginary troubles, and complains that his persecutors do not leave him in peace for a single instant.

To the cases of this kind which I have myself described, I will now add a few more from the practice of other observers.

Leledy[52] relates the case of a coachman, aged 35,

who had no hereditary predisposition, but was of a somewhat morose and petulant temper. He was not addicted to drink, and his mind had been unaffected before an attack of grip, which was of a mild character. During convalescence he was unable to sleep, and thought that every one was against him; he expressed great fear of death, more especially when night came on; he then insisted that the whole family should come to his bedside, and made a sort of confession to them. He threatened those persons who endeavoured to prevent him from doing foolish things, drank his own urine, and deplored the loss of power from which he suffered. In about three weeks the insomnia left him, and he then began to improve. He presently resumed his occupation, and eventually got quite well.

Another instructive case of this kind is reported by Ladame.[109] A lady, aged 44, who had a neurotic history, had grip at the end of December, 1889. The feverish attack was moderate, lasting hardly two days, but when it was over there was anorexia, insomnia, and languor. Soon afterwards symptoms of melancholia were noticed. She took no interest in her surroundings, seemed to have lost all affection for her husband and only son, said that she was lost, refused food, and would not get out of bed, saying she was too weak. She lost flesh, and sent for her solicitor, in order to make her will. This condition, with some variations for better

and worse, lasted about two months. The patient then left her bed, began to eat with a good appetite, and improved rapidly.

Mairet[112] has given the case of a woman, aged 38, in whom the most careful inquiry about her past life as well as the health of her relations, did not yield the slightest evidence that she or they had ever had any neurotic symptom or predisposition. She had an attack of grip in January, 1890, which was not very severe, and from which she had nearly recovered, when, on the seventh or eighth day of the disease, her mind became affected. There was a quiet kind of delirium, without excitement, and with melancholy ideas. Her family was ruined, they would have nothing to live upon, and were lost. A few days afterwards excitement set in, and ten days after the beginning of the delirium she had an apoplectiform attack, with loss of consciousness. When she came to, however, there was no paralysis, except a slight deviation of the mouth. In the meantime the melancholia continued; the patient accused herself of being the cause of all the deaths which had taken place from influenza in her parish. She complained that her husband was putting lucifer matches into her drink in order to poison her; she was going to be put into prison; she saw nothing but spiders about the place; at other times she was surrounded by water, and wanted to drown herself; or all objects

and persons near her appeared to be turned topsy-turvy. She was now admitted into the asylum, where she did not get better; on the contrary, the sensorial perversion became more marked. She was quite dazed, and did not know where she was, or what year it was, etc.

Snell[108] mentions the case of a girl, aged 18, in whom melancholia developed almost directly after the attack of grip was over. She was going to be admitted into an asylum, when she committed suicide by hanging herself.

Martin, quoted by Ladame,[109] has described the case of a coffee-house keeper, aged 45, of temperate and regular habits, happy at home and in easy circumstances, who was in good health, when he had an attack of grip, of medium intensity, which lasted three days. He did not feel well afterwards, but refused to see a doctor, was sad and melancholy, and complained of great lassitude. He several times spoke of being tired of life, and about a fortnight after the attack was over, cut his throat with a pocket-knife, severing the wind-pipe and the carotid.

In this case there was hereditary predisposition, as a brother of the patient had previously committed suicide.

Psychoses of the same character as those described are apt to occur after other infectious diseases of some-

what longer duration, more particularly after typhoid and rheumatic fevers and whooping-cough.

II. The second group of post-grippal psychoses, of which Case 3 is a representative, is characterised by excitement rather than by depression. The symptoms are apt to occur either immediately after a crisis, when there has been a sudden considerable fall of temperature and profuse perspiration, or within a week or two after the fever has subsided, during which time the patient has generally suffered from insomnia, prostration, and loss of appetite. There is confusion of ideas, delirium, which may be of a maniacal character, and an abundant crop of delusions. The delirium habitually lasts from a few days to a fortnight, after which the patient either recovers or gets into a condition of melancholia, or even dementia, which may continue from a few weeks to several months. These cases are therefore analogous to those which Hermann Weber[114] has so ably described as instances of acute insanity, or delirium of collapse, and which are seen chiefly after infectious fevers of short duration, such as pneumonia, measles, scarlet fever, small-pox, and the puerperal state. There are several forms of them, characterised by rapid deterioration of the mental faculties, or primary dementia, or confusion with hallucinations, etc. The condition is always, however, owing to sudden exhaustion of brain power from excessive destruction of the unoxidised albumen of the

cerebral tissue, and for this reason I consider the term *Delirium of Inanition* to be the most appropriate. The inanition is indeed sometimes so great as to lead to a fatal issue, the patients dying with the symptoms of sudden cardiac failure and collapse.

Mairet[112] has given the case of a gentleman, aged 50, who had never shown any trace of neurotic predisposition throughout his previous life, but whose mother had had softening of the brain and dementia, when she was 50 years of age. This patient had a slight attack of grip in January, 1890, without much fever or localised symptoms; he was, however, twelve days in bed, after which the fever was gone and only some anorexia remained. Five days afterwards his doctor allowed him to go out, but he soon returned home, complained of a severe headache, and had almost immediately afterwards an attack of violent delirium, with hallucinations and excitement. He exclaimed that he had ruined himself and his family; he saw people behind his bed-curtains, who threatened to murder him, and in order to escape from them he attempted to jump out of the window. He struggled with his attendants and had no sleep at all. He was confused, the speech was thick, and there was paresis of the bladder. The prognosis appeared therefore somewhat grave, but after eight or ten days the delirium subsided, the apparent state of dementia and the paresis of the bladder disappeared, and about three

weeks after the beginning of the affection, the patient was quite well again.

A somewhat analogous case has been related by Schmitz.[102] The patient was a shoemaker, aged 24, in whose family there was no history whatever of mental or nervous diseases. He had always been in good health himself, except that in consequence of an accident, when 16 years of age, his left foot had to be amputated, and that he occasionally felt pain in the stump. In January, 1890, all the inhabitants of the house in which he lived had influenza. He had it himself slightly, complaining chiefly of headache, loss of appetite and insomnia, but there was little or no fever or prostration. Five days afterwards he commenced having visual and auditory hallucinations. He complained that there were two men and a woman standing at the window, who wanted to drown him. He could not sleep, was constantly jumping out of bed, bolted all the doors, and listened intently, sometimes in one place and sometimes in another. Next morning he seemed better, but became again more restless towards evening. He went to a friend to borrow a pitch-fork, after which he was locked in a room; he then jumped out of the window, and stuck the pitch-fork repeatedly into the street-door, saying that he wanted to stab the wretches. On another occasion he took up a bread-knife and ran along the street, looking for his persecutors, telling a

boy whom he met to take himself off, as otherwise he would be dead to-morrow. The whole neighbourhood eventually became alarmed, and he was sent to an asylum ; he soon recovered there, and was discharged at the end of February.

Leledy[52] has seen the case of a priest, aged 46, without any hereditary stain, who was generally in fair health, but habitually suffered from impaired digestion. He had influenza with rather severe bronchitis, insomnia, and loss of appetite. On the fifteenth day he began to be excited, and had grand delusions. He had been made a Cardinal, and then Pope. He soon became violent, caressed the Sisters who nursed him, and afterwards kicked them, boxed their ears, spat into their faces, and threatened to kill them.

The agitation increased as time went on, and he eventually escaped from his room, ran, only half-dressed, into the church, where another priest was celebrating, mounted the pulpit and shouted to the congregation that the celebrant was not doing the work properly, called upon them to receive his own blessing, and then threw chairs and benches at their heads. He also gave expression to erotic feelings and made indecent proposals to the Sisters who nursed him. When he was taken to the asylum he smashed the windows of the carriage, shouted, screamed, foamed at the mouth, threatened the people with excommunication, said that he was the

representative of Heaven on earth, and endeavoured to kiss and bite alternately. This delirium continued for four days more; the patient then became calmer, and a month after the beginning of the mental affection he was well enough to be discharged and to go into the country to recuperate.

The result is, however, not always so satisfactory as it was in the foregoing cases. Thus, Mispelbaum[110] has seen a youth aged 16, whose mother, when quite young, had been for three months in an asylum, but who had since then been quite well. He had an attack of grip at the end of December, 1889, was in bed for two days, then got up, and about a week afterwards felt well enough to resume his occupation as a mason's apprentice. Five days after he had gone back to work, however, the first symptoms of mental confusion occurred. He thought another lad was lying in his bed; he did not recognise his friends, or called them by wrong names; could not swallow, did not call for food, lay in bed with his eyes closed, and passed the excreta under him. He appeared terrified, cried and sobbed, and said he had perjured himself. He also had hallucinations of vision, vertigo, and vomiting. He gradually improved, but was not well towards the end of March, and his faculties seemed to have suffered to such an extent that chronic dementia was feared.

Bartels[101] has met with a case which shows that the

delirium of inanition may also ensue after influenza in those previously insane. His patient was an old lunatic, who had been habitually full of stationary delusions. After an attack of influenza, however, he got into a state of the utmost anxiety and confusion, which appeared to be caused by hallucinations, became prostrate and died. The autopsy showed chronic pachymeningitis and leptomeningitis.

III. The third group of post-grippal psychoses includes those cases in which grip forms, as it were, only the accidental exciting cause of a mental affection in persons who are strongly predisposed to the latter, or have already suffered from previous attacks of insanity or allied neuroses. In such persons the psychosis does not assume the clinical features of those mental affections which are particularly apt to occur after infectious diseases. Thus there may be a sudden attack of delirium tremens in an alcoholized person, or acute mania in one who has previously had it, etc. The attack of influenza, therefore, only forms, as it were, the last link in a chain of events tending to produce mental disturbance, which might also have broken out in consequence of any other exciting cause, or indeed without any such cause at all. Indeed, the attack of grip in such cases appears to be the last straw that breaks the camel's back. The character of these psychoses is therefore not so much determined by the special in-

fectious disease as by the individual peculiarity of the patient, and may for this reason assume the most varied characters.

Case 4, which is a representative of this class, was one in which homicidal impulses appeared after grip.

Maunoir, quoted by Ladame,[109] mentions the case of a medical student, aged 26, who had previously suffered from depression and other symptoms of mental disturbance, and after an attack of influenza, developed a suicidal tendency. He told his friends that he preferred dividing the carotids to any other form of suicide. The day before his death he spent the evening with his friends, was very animated in conversation, and borrowed books from them. The following morning he cut his throat.

The newspapers of the time[119] reported the case of a young man, aged 22, who had generally behaved quite properly, but was of a taciturn disposition, and probably hereditarily predisposed. He had influenza badly, and his sister had just died of the same complaint. Apparently under the influence of these exciting causes, he suddenly killed his mother, with whom he had been talking quietly only a minute before, with a single blow of a hatchet. He then carried the hatchet back to the place from where he had taken it, and when the neighbours, attracted by the noise, rushed into the

room, he walked about quite unconcernedly, as if nothing had happened. He was taken in charge, but did not seem to realise the situation.

Leledy[113] mentions the case of a woman, aged 35, whose father was an habitual drunkard, and had been insane; the mother had died of heart disease. She often suffered from headaches, and had very pronounced religious views. When her father died she expected to receive a considerable sum of money, but it turned out that the will had been made in favour of her brother. She was very much annoyed at this, and a change in her manner was noticed; she became morose, was apt to cry, and wanted to be left alone. She had grip in January, 1890, of a mild type, and got apparently well over it.

Soon afterwards, however, she became excited and incoherent, left her home, and wandered about the country. Violence and grand delusions soon became developed. When admitted into the asylum she boxed her husband's ears, shouted that she had been robbed of her money, and of her patent of nobility. She was a countess, and wanted her dresses and jewels back. She struck the Sisters, servants, and the other patients, and endeavoured to bite, tore up her clothes, and had no sleep. From time to time there was a period of relative calm, which, however, did not last. She soon became so violent again that she had to be isolated; even in the

intervals of quiet she continued incoherent, unduly talkative, and full of delusions.

Kraepelin[95] has described the case of a farmer's son, aged 20, whose brother was subject to stammering, and who had two cousins who were insane. He had for years past suffered from a form of spasmodic torticollis, and expressed odd ideas about his being called upon to restore peace in his family. He was laid up with influenza for a week, and then resumed work, but had a relapse, when he began to chatter away all day long, was very restless, irritable, conceited, read aloud from the Bible, and made speeches. After a time, however, he quieted down and resumed work.

The same observer has in another case seen a sudden development of paralysis with aphasia and impaired memory, hypochondriacal and grand delusions, which had until then been latent (?), and a young epileptic in whom heavy lethargy came on after influenza.

Snell[108] mentions the case of a factory girl, aged 17, who had been admitted into the asylum of Hildesheim for melancholia. The latter condition was, after a time, followed by a state of merry excitement; but eventually the girl quieted down, was convalescent and fit for discharge, when she was seized with influenza, from which she made an apparently good recovery. About a month afterwards, however, malaise with vomiting set in, and was followed by a most severe form of mania.

The state of this patient was greatly aggravated by the intercurrent attack of grip.

IV. The 4th and last class of post-grippal psychoses consists of cases of general paralysis of the insane, where no doubt can exist that grave degenerative lesions of the cortex and the cerebral membranes are present. I much regret that I could not obtain a post-mortem examination in Case 5, in which coarse lesions, similar to those habitually found in general paralysis, would unquestionably have been discovered. That case was remarkable by the exceedingly rapid development of grave symptoms, pointing to organic brain disease, and ran an unusually quick course, carrying the patient off in less than six months, while where general paralysis is owing to syphilis and other causes, the duration of the disease is habitually at least two years, and often very much longer. The grippo-toxine is therefore shown to be in certain cases a poison of greater virulence than the syphilitic toxine.

I confess that I do not understand what Kraepelin[94] means by saying (*l. c.*) that there had been in one of his cases a sudden development of paralysis with impaired language and hypochrondriacal and grand delusions, which had been *latent* until influenza brought them out. I have never seen latent paralysis or aphasia, and I suspect that the case alluded to was similar to my cases of general paralysis (5 and 6).

The successful result in Case 6 shows that energetic treatment may be followed by recovery even where structural disease has already commenced.

PATHOGENESIS.

Let us now inquire how these post-grippal psychoses, the clinical features of which I have just described, originate.

I will consider, 1st, the influence of the fever; 2nd, that of the grippo-toxine; and 3rd, the individual susceptibility of the patient.

1. *The Fever.*—That a rise in the temperature of the blood must have an important influence on the nutrition, and consequently on the functions, of the brain-cells, appears self-evident. Increased heat constitutes an irritant for all nerve tissues. A frog's leg, which is artificially heated by a few degrees, is at first irritated, so that slight stimuli cause excessive responses, and afterwards paralysed, when stimulation has no longer any influence at all.

Clinically the same effect is seen in heatstroke and the hyper-pyrexia of rheumatic fever, and also in such infectious fevers as pneumonia, intermittent fever, and the acute exanthemata, where the nerve centres experience a more or less sudden elevation of temperature, amounting perhaps to 4° or 5°. The consequence of this is in-

creased oxidation of the uncombined albumen of the brain, and such a chemical change must of itself lead to irritation, followed by depression.

There is as yet very little accurate information about the more intimate changes caused in the metabolism of the brain and the body by the fever-heat; and the most recent researches of Loewy[116] have thrown no further light on this point, except than to make it clear that the destruction of albumen is invariably increased in fever, while the destruction of fat is rather diminished, except in cases where accidental agencies are active, more especially increased muscular action, when the oxidation of fat may also be more or less augmented. Anyhow, it is evident that, when the supply of unoxidised albumen in the brain is exhausted, the mental faculties must become impaired.

A factor which has to be considered in addition to the fever-heat is the acceleration of the heart's action, which co-exists with the beginning and acme of the fever, and which causes of itself an active hyperæmia of the brain. A mechanical agency is thus added to the chemical one. An unduly large amount of overheated blood is supplied to the brain within a given period, thus increasing the irritation. That there is really active hyperæmia of the brain during fever, is shown by the clinical symptoms of fulness in the head, excitement, restlessness, insomnia, undue sensitiveness to light and

sounds, by the examination of the fundus of the eye, and the beneficial results of a depleting treatment. After a time, however, there is failure of the heart's power, with or without a fall of temperature; and the necessary consequence of this is passive congestion in the cerebral and meningeal veins, which, in its turn, leads to anæmia and impaired nutrition of the cerebral substance, and in severe cases to œdema of the brain.

The clinical symptoms corresponding to this condition are light-headedness, a dazed state, which may be followed by maniacal excitement and violent delirium, and ends in coma and death.

II.—*Grippo-Toxine.*

While, therefore, the fever-heat, and the unduly violent cardiac action undoubtedly tend to cause impaired nutrition of the brain substance, there is another factor which, in my opinion, has an infinitely more powerful influence in that direction, and that is the presence in the blood of grippo-toxine. That this poison affects the brain injuriously of itself is shown by the circumstance that in grip, as well as in some other infectious fevers, such as small-pox, typhoid, intermittent and scarlet fever, delirium may be the first symptom of the illness, before the temperature of the blood has risen, or the heart's action has become accelerated (vide p. 38).

That the fever has much less to do with the production of post-grippal psychoses than the special toxine of the malady is also shown by the circumstance that it is generally short, and in many cases insignificant. The temperature often does not exceed 101° or 102°, and continues at this rate only for a day or two, so that the case would almost appear like one of simple febricula; yet the prostration of mental and bodily strength which follows is so profound, as to be quite inexplicable, except on the assumption of deterioration of the nerve centres by the grippo-toxine. Indeed the degree of fever bears often no relation whatever to the gravity of the mental affections following in its wake. We see in this an analogy with syphilis, where the primary symptoms may be so slight that they attract very little attention, and yet are followed by severe secondary and tertiary manifestations. The deleterious effects of grippo-toxine do not cease with the fever, and I contend that *this virus is the principal agent in the causation of the psychoses which are apt to occur after grip.*

III.—*Individual Predisposition.*

I have now to discuss one of the most difficult points in the pathogenesis of post-grippal psychoses, and regret to find myself here at issue with almost all authors who have written on this subject. Up to the present time it

has been generally assumed that grip alone is not sufficient to cause any psychoses, and that it is necessary for the production of these latter that there should be an hereditary or acquired neurotic predisposition in those who are affected by these troubles. Kraepelin[95] lays this down as an axiom in the most unequivocal terms. He states plainly that in the production of post-grippal psychoses there are invariably other active causes at work besides the influenza, and that the latter alone is insufficient to cause acute insanity in a normally constituted person. In his opinion the influence of grip is altogether a factor of little importance, while predisposition, or other noxious agents—such as anæmia, chronic lung-disease, gastric catarrh, cardiac affections, the puerperal state, and, finally, depressing emotions occurring after the feverish attack—must be held responsible for the outbreak of insanity in the cases in question.

Ladame[109] absolutely agrees with Kraepelin in this point, and states that individual predisposition, hereditary or acquired, plays the principal part in these affections. He says, "On trouve toujours des causes prédisposantes à la folie qui suit l'influenza" (*l. c.*, p. 30), and "l'influenza à elle seule ne suffit jamais à provoquer la folie" (*l. c.*, p. 40). Again, Leledy[113] states that, "le role joué par la grippe peut être variable. Tantôt cause occasionnelle, elle peut être ailleurs cause déterminante, adjuvante. Là s'arrête le rôle étiologique de la grippe qui ne saurait

être regardée comme cause essentielle, cause pathogène. Il existe toujours une prédisposition innée ou acquise." The same opinion is expressed by Van Deventer,[105] Bidon,[37] Kirn,[103] and only Mairet[112] states that grip may act, not only as an exciting and determining cause, but also as the essential or pathogenic cause.

Savage[113] likewise thinks that the occurrence of previous attacks of insanity, the existence of alcoholism, the presence of some degeneration, such as syphilis or the menopause, the presence of neurotic inheritance, or of old brain injury, are almost necessary for the development of insanity after influenza.

As for myself, I am utterly opposed to the theory which assigns the determining part in the causation of all post-grippal psychoses to a neurotic predisposition of those in whom they have become developed, and I now proceed to give my reasons for the contrary opinion at which I have arrived.

In five out of the six cases which I have described above, the most careful inquiry did not elicit any predisposition, either in the patients themselves or their families. Since then I have perused the reports of other authors, and have found that out of 107 cases, in which the history of the patients has been mentioned, there was a neurotic predisposition in 67, and no predisposition in 30. This, when expressed in percentages, means that 62·8 were predisposed, and 37·2 were not so.

Predisposition, therefore, although undoubtedly an important adjuvant in the production of these psychoses, is plainly shown not to be their exclusive etiological factor. Now the question remains to be answered why, when so many suffer from grip, comparatively so few should afterwards become mentally afflicted.

Two modes of accounting for this fact have suggested themselves to me. In the first place, I consider it consonant with the results of clinical observation to say that *idiosyncrasy*—which is well known to exist more or less in all of us, not only with regard to medicines and poisons, but also to articles of food—is shown in a peculiarly striking manner by the patient's response to the action of grippo-toxine in the system. There is probably no disease, and certainly no infectious malady, in which the symptoms are so extremely variable as they are found to be in influenza. Indeed, hardly a single case of it is like the other. The fever, for instance, does not show any such constant curve as we see in typhoid and intermittent, but is throughout characterised by the highest degree of variability which it is possible to conceive. While in the one case it may last no longer than twelve hours, it is in another protracted over three weeks. Again, the fever-heat varies in different cases from 100° to 110°, and there is the greatest irregularity in morning and evening temperatures. The heat is often greater in the morning

than at any other part of the day, and sudden changes take place within a few hours to which we are not accustomed in other febrile diseases. The same holds good for other symptoms, and it is indeed the unexpected which constantly happens in grip. While in some cases headache forms the most prominent symptom, pain in the loins, or delirium, or giddiness, or vomiting, or cough, or prostration, or diarrhœa, do so in others. How are we to account for this except by assuming that the influence of individual idiosyncrasy is carried to a very high pitch in the response of patients to the action of grippo-toxine? Idiosyncrasy, however, is an entirely different thing from a special morbid tendency, and is known to exist in all those who otherwise are in a normal state. Without idiosyncrasies we should not be individuals, and idiosyncrasy moves within strictly physiological lines, without being attainted by pathological tendencies. I therefore contend that simply from the effects of idiosyncrasy, persons may be affected with mental disorder from the effects of grippo-toxine without there being any neurotic tendency, either in the patients or their ancestors. As a counterpart to this I may mention that I have seen a considerable number of intensely neurotic persons, who have had not only one, but two, and some of them even three attacks of grip, but apparently without any such special idiosyncrasy, and who have not been troubled after

convalescence, either with psychoses or with any other nerve-diseases.

Another way of accounting for this phenomenon has suggested itself to me, which appears *primâ facie* plausible, but is at present not susceptible of proof, owing to our ignorance of the chemical constitution of grippo-toxine and its congeners. I will therefore here content myself with asking the question, Whether grippo-toxine and indeed all other toxines are invariably of the same composition, or whether there are different degrees and varieties of toxic power in the poisons formed by the same bacteria? It is easy to imagine that the same species of bacteria may originate poisons of different strength or qualities, according to the peculiarity of the soil in which they breed or their own peculiar inherent vitality at the time they infest the system. I therefore throw out the suggestion that in cases where psychoses follow the feverish attack, *a toxine of specially deleterious influence upon the grey matter of the cortex may have been formed in the system.*

This leads me to discuss another point on which I cannot agree with others who have written on the same subject. Is there anything specific or characteristic in post-grippal psychoses which does not occur in other infectious fevers? Kraepelin,[95] Ladame,[109] and others express the opinion that there is not, and that grip stands in this respect on the same level with measles

and other infectious diseases. I think that this opinion has been given without due consideration of the facts of the case, and contend that there are peculiarities in the appearance and nature of the post-grippal psychoses which are not found in other post-febrile mental affections.

1. With regard to this I beg to submit the following considerations. The *number* of cases of psychoses observed after grip is far greater than that seen after any other infectious disease. This might at first sight be accounted for by the circumstance that influenza occurs rather as a pandemic than as an epidemic, and by assuming that, as so many more persons suffer from grip than from other fevers, the number of mental cases is thereby inevitably swelled; but an instant's reflection will show that such an argument is untenable. To take only one other infectious disease, it is well known that measles affects habitually the entire populalation in the course of years, while grip has rarely affected more than 60 per cent. of the people, yet psychoses after measles are very rare. Seeing, therefore, the far greater liability to psychoses after influenza, I contend that the grippo-toxine has a more prejudicial influence on the brain than other morbid poisons. This conclusion is well supported by the argument which I have advanced elsewhere,[29] showing that grippo-toxine has a special affinity for the medulla oblongata, and that

by irritating that organ it causes a variety of remote effects in other portions of the nervous system.

2. There is a much greater *variety* of psychoses observed after grip than are met with after other fevers. We have seen that the first class of these maladies, which comprises cases of neurasthenia, hypochondriasis and melancholia, is the same as that which is seen after infectious diseases of comparatively long duration, such as typhoid and rheumatic fever and whooping-cough; while the second class, which comprises cases of delirium, of inanition and analogous troubles, is the same as that seen after comparatively short fevers, such as pneumonia, the acute exanthemata, and the puerperal state. While, therefore, in other infectious diseases only a limited variety of psychoses is apt to occur, we have in influenza on the contrary, not only cases of both these classes indiscriminately, but also instances of other forms of mental disease occurring in those who are highly predisposed to them, or who have already suffered from similar affections; and finally a peculiarly rapid—I might almost say galloping—form of general paralysis of the insane.

Such an assembly of different kinds of mental affections is not seen after any other infectious fever; and I therefore consider myself justified in stating that grippotoxine has a more specifically noxious influence upon cerebral nutrition than other morbid poisons.

What holds good for the pathogenesis of post-grippal psychoses, also applies, *cæteris paribus*, to the pathogenesis of other post-grippal affections.

It remains for me to consider the influence of *sex* and *age* on the occurrence of these maladies. In 97 cases in which the ages of the patients have been noted, I have found that there were :—

0	cases	between	1	and	10	years.
16	„	„	11	„	20	„
22	„	„	21	„	30	„
22	„	„	31	„	40	„
22	„	„	41	„	50	„
8	„	„	51	„	60	„
6	„	„	61	„	70	„
1	„	„	71	„	80	„

The ages between 21 and 50, therefore, furnish by far the largest percentage, being 68 per cent. of the entire number.

The *sex* of the patients has been noticed in a much larger number of cases, viz., 166. Amongst these there were 96 males and 70 females, showing a percentage of 57·8 for males and of 42·7 for females. The male sex is therefore more predisposed to post-grippal psychoses than the female.

Is any Mental Affection ever cured by a Feverish Attack of Influenza?

Metz[106] describes the case of a labourer, aged 33, who was admitted into the Asylum of Brake in February, 1889, having threatened to shoot his wife, whom he suspected of unfaithfulness, his landlord, and himself. In the asylum he fought an attendant, and was so excited that he had to be isolated. In January, 1890, he was taken with influenza, the feverish attack of which lasted two days. On the second day after the crisis he wrote a perfectly rational letter to his wife, in which he asked her to pardon him for having insulted her by his suspicions, and explained this by having been ill. This illness had lasted until two days ago, when all of a sudden it had ceased. The behaviour of the patient after this was perfectly rational, and he was therefore discharged a few weeks afterwards. The sudden change coincided with the sudden fall of temperature from 103·2° to 98·8°.

Helweg[90] likewise reports improvement after the feverish attack of grip in two insane patients who had been in the asylum for a considerable time. One was that of a woman, aged 28, who had become demented after an attack of puerperal fever. She was taken with grip and pneumonia, and soon afterwards was found to be considerably improved in her mental condition, so that she was able to resume her occupation. Another

woman, aged 32, who had suffered from a similar psychosis after parturition, likewise became rational after an attack of grippal pneumonia, and could be discharged cured.

A shock to the nervous system is known occasionally to affect insanity beneficially. Symes Thompson[121] mentions a case in which symptoms of insanity were cured by a fall from a second story window. It is also possible that in the cases just alluded to the psychosis was attended with a considerable degree of anæmia of the brain, and that the attack of grip, causing congestion of that organ, may thus have re-established the balance in the circulation.

On the other hand, cases in which the attack of grip was followed by a decided deterioration of the mental condition of those previously insane, have been frequently observed. Bartels[101] has described the case of a man, aged 30, who had been suffering for some time from paranoia, but had become quite quiet, and worked assiduously in the garden. On January 4th he became gripped. A week afterwards there was anxiety, restlessness, and confusion. The patient never recovered his mental balance, gradually sank, and died on March 23rd. Chronic inflammation of the meninges and granulations on the ependyma of the ventricles were found.

Several other observers have mentioned cases in which patients, who had previously been inmates of asylums,

and had been discharged cured, had to be readmitted when taken with grip, which speedily produced a relapse. Munter[120] reports the case of a woman, aged 29, who had lost her catamenia when 19, and was believed to have been very quarrelsome about that period. She had, however, been married seven years, and had behaved quite properly all the time, although she was generally forgetful. Soon after infection with grip she began to quarrel with her neighbours, and told her husband that she was going to be put into prison. She then developed hallucinations of sight, hearing, and smell, which rendered her transference into an asylum necessary, where, at the time of the report, she was still an inmate, being no better.

B.—Post-Grippal Diseases of the Brain and its Membranes.

The principal pathological processes which we have found to accompany or to follow the feverish attack of influenza, are hyperæmia, inflammation and hæmorrhage. These are also the chief processes which can be traced in the complications and sequels of grip. Thrombosis, embolism, and primary atrophy, and sclerosis, in different organs, however, are also apt to appear as direct sequences of the feverish attack.

I.—*Hyperæmia.*

1. The anatomical observations of Helweg[90] and Maillart[118] on hyperæmia of the brain and its membranes have already been mentioned (p. 79). One of Maillart's cases was that of a domestic servant, aged 25, who was in perfect health on Dec. 24, 1889, while several members of the family with which she lived were strongly gripped. The following day she was suddenly taken with bilious vomiting and intense pain, which made her scream. There was great excitement and grinding of teeth the next day, and she complained of violent headache and epigastric pain. The day after this she became comatose and did not recognise anyone, but struck the walls with her fists. The face was alternately red and pale. The temperature rose during the next day from 101° to 104·8°, pulse was 130; there was trismus, and she died on the fourth day. The membranes and the substance of the brain appeared healthy, but the right hemisphere of the cerebellum was strongly hyperæmic, and the white substance greatly softened. The coats of the blood-vessels showed fatty degeneration. The left hemisphere was healthy.

Kohts[123] has described the case of a girl, aged 3, who had on the fourteenth day of a severe feverish attack of grip, unilateral convulsions, which afterwards spread to the other side. When the convulsions subsided, it

was found that she had left hemiplegia, paralysis of the sixth nerve and the portio dura, rigid pupils, nystagmus, aphasia, and hyperæsthesia of the skin. The post-mortem examination showed hyperæmia of the dura and pia, as well as of the cortex and the central ganglia.

Numerous cases have also been recorded in which the symptoms could only be explained by assuming the existence of a severe degree of cerebral hyperæmia; but as recovery took place, it was impossible to verify the fact by inspection. Such was a case related by Piggott.[45] A male child, aged one year and ten months, was suddenly taken ill during the epidemic of grip, and found to have a temperature of 105°, and a pulse of 140. He was, when examined, found to be completely unconscious, had stertorous breathing, and loss of the conjunctival reflex. The same evening the temperature had fallen to 100°, the pulse to 120; he had recovered consciousness, but was very restless. The conjunctivæ were injected. Next morning the temperature and pulse were normal, and the little patient was practically well.

Again, Hall[124] has described the case of a brother and sister, who both fell ill of the prevailing epidemic; the girl recovered, but the boy was taken with a convulsion, which was followed at intervals by seven or eight other seizures, and died the same evening. It appears most probable that sudden intense hyperæmia of the cortex

and other portions of the brain, caused the fatal result in this case.

Blomfield[123] has described a somewhat similar case, in which it is, however, not quite clear that there was any direct causal connection between influenza and the cerebral hyperæmia which was undoubtedly present.

2. *Hæmorrhage.*

A case of hæmorrhage of the brain, recorded by Pick,[82] has already been described (p. 70). Senator[124] has seen a patient who fell ill with fever, catarrh, nervous and muscular pains, and profuse epistaxis; right hemiplegia then suddenly appeared, and the patient died the day after. Virchow, who made the autopsy, found hæmorrhage in the left cortex; round the clot there were small abscesses, and there was a broad œdematous zone traversed by capillary apoplexies. There was also found broncho-pneumonia, hæmorrhage in the kidneys, and mitral endocarditis.

Maillart[48] mentions the case of a man, aged 47, who became gripped at the beginning of 1890, having headache and pain in the neck, vertigo, indistinct sight, backache, and vomiting. He never felt well afterwards, and about three months later had a second attack. He felt giddy, lost his consciousness for half-an-hour, and there was incontinence of the excreta. Since then he complained of violent headache and pain all over. On

admission, the pulse was 50 and regular; sensibility and mobility were normal, and temperature was 101·4°. The day after he was somnolent, and the next day he expired somewhat suddenly. The autopsy showed profuse hæmorrhage at the base of the brain on each side in the middle fossa. The seat of it was sub-arachnoid, but it continued into the upper portion of the spinal canal. The hæmorrhage originated from an aneurysm of the basilar artery, of the size of a pea, which had become ruptured on its antero-inferior aspect. The brain substance was firm and consistent, and there was some liquid blood in the lateral ventricle. There was also granular ependymitis.

Fürbringer[125] has described the case of a servant-girl, aged 27, who was admitted into the hospital in a state of unconsciousness. It appeared that she had been in perfect health until about a fortnight before, when she suddenly complained of numbness and loss of power in the right arm. This, however, went off again, and she resumed her work during the next few years. She complained, however, of great lassitude and loss of appetite. At this period there was no fever or bronchitis; but as she talked in a strange way, and was very weak, her mistress sent her home. She improved, and was on the point of returning to her situation, when one morning she was suddenly taken with headache, sickness and prostration. The old feeling of numbness in the right

arm returned, and was soon followed by hemi-paresis and somnolence. During the night she vomited; next morning she was unconscious and had convulsions all over the body for an hour. These returned in the evening and she was then sent into the hospital. The pupils did then not react to the light; she ground her teeth, yawned, and had convulsive twitches. The limbs were alternately flabby and rigid, the knee-jerk exaggerated, the excreta passed into bed; the temperature and pulse were about normal, but the pulse presently became fuller and slower, falling to 78. Next morning there were fresh convulsive attacks, the temperature, which had in the meantime become sub-normal, rose; the retinal veins appeared gorged with blood, and peculiar twitches were seen in the alæ nasi; the temperature eventually reached 105·4°, the pulse was 100; there were 36 respirations, paralysis of the limbs, and loss of knee-jerk supervened. She died in the evening without having regained consciousness.

The autopsy showed the heart to be normal; there were severe purulent bronchitis and small foci of broncho-pneumonia; the spleen was enlarged, soft, and hyperæmic; hæmorrhages were seen in the omentum and the small intestines; the sinus longitudinalis and adjoining veins, as well as most of the veins of the pia of the convexity, were thrombosed with dark red firm clots. In both hemispheres, more especially the central

convolutions, there was a hæmorrhagic infarctus of the size of a fowl's egg, filled with blood and lacerated brain-matter. These focal lesions, which affected both the grey and white matter, were surrounded by a zone of softened yellowish substance, traversed by numberless punctiform hæmorrhages, several centimetres wide, and reaching right into the depth of the centrum ovale. There was a somewhat smaller focus of the size of a walnut, with less blood, at the anterior edge of the right occipital lobe.

3. *Inflammation.*

A case is recorded by Fürbringer,[125] in which the patient, a merchant, aged 32, and previously in good health, was suddenly taken with pain in the head and loins, cough, fever, and prostration. The doctor requested him to keep his bed, but the patient went about all the same the next few days, and indulged one evening in indigestible food. The morning after this he was sick and had gastric pain. The abdomen was retracted and the patient restless. He shortly afterwards became dazed, fell out of his bed, lost consciousness, and presently developed mania. This was followed by coma; he passed the excreta into bed; the temperature rose to 104°; he showed signs of œdema of the lungs, and died on the eighth day of the illness. The autopsy showed hæmorrhagic encephalitis of unusual extent and severity.

The whole substance of both central ganglia was softened, the grey matter traversed by numerous hæmorrhages, which appeared either punctuated or in the shape of stripes. Smaller focal lesions of the same character were found in the crura, the cerebellar hemispheres, and the pons. In the lower lobes of both lungs there were several small and large foci of bronchitis. The spleen was hyperæmic.

Meningitis appears to be a frequent complication of influenza. Leichtenstern[126] has described the case of a woman, aged 25, who had been in good health before she became gripped; she had fever, headache, and presently developed severe vomiting, with rigidity of the neck. She died comatose on the fourth day of the illness. There was found internal hæmorrhagic pachymeningitis and hæmorrhage in the lepto-meninx of the convexity of the brain, with pus along some of the larger blood-vessels, the cortex being softened in parts by hæmorrhage. There was no embolism.

Maillart[48] mentions the case of a man, aged 40, who was brought into the hospital with delirium and hallucinations, and had had grip severely for some days. The conjunctivæ were congested in their lower part, the lips and nostrils appeared dusky, the complexion was yellow. He died on the seventh day of the illness. The autopsy showed extremely severe congestion of the pia mater, which was covered with a thick layer of a

slightly opaque liquid. There was also evidence of chronic gastritis, which was believed to be due to intemperate habits.

The same observer speaks of a woman, aged 60, who had grip in December, 1889, but neglected it, and continued her work as cook. A few days afterwards she was taken with pneumonia; on the ninth day she became sick, and the temperature suddenly rose from 99·4° to 104°. She was now completely lethargic and comatose; there was incontinence of the excreta; the pulse became irregular and small, there was profuse perspiration, and the left pupil appeared larger than the right. She died about eighteen hours after the commencement of these symptoms. The autopsy showed that the dura was healthy, but the whole pia was covered with a thick layer of greenish thick and ropy pus, at the base as well as the convexity, and was greatly œdematous. The lateral ventricles were filled with pus of the same character. The consistency of the brain substance was normal. The pus contained numerous chains of streptococci, but none of Fraenkel's pneumococci. The left lung showed partly grey and partly red hepatisation; there was bilateral interstitial nephritis, and the uterus contained about a tablespoonful of pus, exactly similar to that which had been found in the brain.

Another case described by Maillart was that of a

hairdresser, aged 40, who was suddenly taken with fever and delirium. The lower half of the conjunctiva was much congested, the pupils contracted; he screamed, was violent, had apparently visual hallucinations, and incessantly repeated inarticulate sounds. He died seven days after admission. The dura appeared healthy, while the pia showed strong œdematous infiltration at the base as well as at the convexity; the vessels were greatly distended, but the substance of the brain appeared normal.

Nicholson[67] has seen meningitis in a woman aged 42, who had been ill with influenza for a week, there being tonsillitis at the commencement. Two or three days before her death the headache became much more severe, and thirty-six hours before the end drowsiness supervened, passing into deep coma. There was no vomiting, no convulsions, no paralysis, and no rigidity of the neck or retraction. The post-mortem examination revealed extensive meningitis, there being a good deal of lymph becoming purulent over the temporo-sphenoidal and parietal lobes on both sides, especially the left, and also some at the base, spreading on each side into the Sylvian fissure. The pia mater was very œdematous and much congested all over the hemispheres, and there was a considerable excess of serum.

Fürbringer[125] has seen fatal purulent meningitis, associated with hæmorrhagic dermatitis and myositis of

the upper extremities, hæmorrhage in the kidneys, and croupous pneumonia. In some cases, which did not end fatally, there was presumably also meningitis. One of them was that of a lady aged 27, of a somewhat nervous temperament, who fell ill quite suddenly with severe headache, cough, pain in the chest, back and limbs, and anorexia. The next few days she felt very weak generally, but seemed to recover at the end of a week. She got up soon afterwards, and was very busy writing letters and receiving visitors, in spite of orders to the contrary from the doctor. The evening of the same day she had a violent cough and epistaxis. Next day she complained of severe pain in the forehead and occiput, vertigo, apathy, extreme weakness, and insomnia; this was followed by sickness, palpitations, and collapse. The pulse was slow, 52, and of high tension; there was rigidity of the neck; the pupils were sluggish, the knee-jerk slightly exaggerated. A day or two after she had a fit of drawing back of the head, with Cheyne-Stokes's respiration and a small frequent pulse. In a week, however, she got better, and made a good recovery.

Hebblethwaite[127] has described a case of what he thinks was tubercular meningitis, but which may have been just as well one of purulent meningitis, or abscess of the brain. The patient, a boy, aged 15, had epistaxis, severe pain in the loins and legs, a temperature of 102°,

and a small patch of broncho-pneumonia on the left side. At the end of four days he was much better, the temperature was normal, and the pain nearly gone. Five days afterwards, however, after he had been allowed to get up, he became drowsy, complained of lassitude and headache, lay in bed all day, took no interest in his surroundings, and had a temperature of 101°. The next few days he got worse, had twitches in the right arm and fingers, and picked at the bed-clothes. The left arm and leg presently became paralysed, the abdomen was hard, coma set in, and the temperature fell to 94·6°. He died on the fifteenth day of the illness, but no inspection could be obtained.

Meningitis has sometimes been the consequence of otitis, or of periostitis of the cranial bones.

Bäumler[47] has recorded the case of a cooper, aged 19, who fell ill during the epidemic of grip at the end of 1889, with headache and shivering fits. The next day his temperature was 104·5°, and on the right side of the forehead there appeared a swelling as large as half-a-crown, which was tender on pressure. Presently delirium supervened, with vertigo and vomiting, and paralysis and anæsthesia of the left side of the body. The fever was irregular, with several rigors. The swelling on the forehead was opened and offensive pus was discharged; the periosteum appeared detached, and the bone discoloured. Death ensued on the sixteenth day of the

illness. The autopsy showed external suppurative meningitis of the right side, a collection of pus beneath the dura mater, above the right hemisphere, which had become flattened by it, and the right sinus frontalis contained offensive pus.

Bristowe[49] speaks of a young lady, aged 18, who became gripped after several other members of her family had suffered from the same disease. In the evening of the first day she complained of intense pain in the left ear, and the right ear presently also became involved. She passed a night of great agony, but by the morning the earache had subsided, leaving her however deaf. The following day she felt very poorly, and was sick; during the ensuing night she was restless. Next morning the temperature was found to be 105°. Signs of pneumonia were presently detected, the headache became more intense, and she began to ramble a little. Later on she became maniacal, and suffered from hallucinations. The temperature was then 106°, the pulse 136, and she died on the ninth day of the illness.

Eichhorst[128] records the case of a woman, aged 60, who had recovered from influenza and pneumonia, but suddenly became comatose, and died on the twenty-first day. The autopsy showed purulent meningitis and effusion into the ventricles.

Cases of purulent meningitis have also been described by Kormann[129] and Leyden[130]; and Ewald[51] mentions

the case of a young doctor who, during convalescence from grip, was seized with violent neuralgia of the fifth nerve, followed by empyema of the antrum, delirium, and death. The autopsy showed basal meningitis. Guibout has seen three fatal cases of meningitis in children, and Sokolowski,[131] of Warsaw, reports the same number of cases.

4. *Abscess of the Brain.*

Bristowe[49] has given a careful description of four such cases, in two of which he obtained an inspection, while in two others, in which no autopsy could be obtained, the symptoms were such as to suggest that cerebral suppuration had supervened. One of these patients was a girl, aged 14, who was at a school where 175 girls and two mistresses were attacked with the complaint. The principal symptoms were intense headache, rigidity of the muscles of the neck, and photophobia; she eventually passed into a comatose condition and died, and the autopsy showed an abscess of the size of a tangerine orange in the right occipital lobe. The parietes were well defined, their inner aspect being shreddy, and the brain substance immediately adjoining being softened and discoloured. The purulent contents were thick and somewhat ill-smelling. There was a small communication between the abscess and the descending cornu of the lateral ventrical, which contained

about a drachm of thin pus. A smaller quantity of similar fluid was found in the left ventricle. The dura mater was perfectly healthy; and there was no trace of disease in any part of the bony parietes of the skull. Both ears and the frontal sinuses were specially examined, and were found healthy. The spinal column, the membranes of the cord, and the cord itself, were also healthy.

Another case was that of a carman, aged 24, whose illness had begun suddenly about two months ago with shivering, severe headache, and pains all over him. The peculiar feature of his case consisted of convulsive fits affecting the right side of the body, followed by right hemiplegia and aphasia, with pain in the head. Although he could see with both eyes, the discs were swollen, greyish, without clear margins, and there were small hæmorrhages. He gradually became more apathetic and died comatose. The temperature which had been generally normal or subnormal had eventually risen to 100·2°. The autopsy showed an abscess as large as a small tangerine orange in the upper part of the left hemisphere, occupying the posterior part of the frontal and the adjoining part of the parietal lobe; on being incised, about two ounces of tenacious greenish pus escaped from the cavity. There was no disease of the ear, nor any other condition which could have thrown light on the origin of the abscess.

Bidon[37] reports the case of a carman, aged 44, who was taken with influenza and bronchitis in January. About a month afterwards, as he was not getting better, he was admitted into the hospital, complaining chiefly of deafness and persistent headache. In another month the bronchitis was gone, and the headache rather less, when he was suddenly taken with a bulbar crisis, viz., loss of consciousness, pallor, intense dyspnœa, Cheyne-Stokes's breathing, a slow pulse and general prostration. After a few hypodermic injections of ether he revived, but next day there was crossed paralysis, affecting the right arm and the left leg. These symptoms improved presently, when a few days subsequently there was a fresh bulbar attack, with right hemiplegia. The coma deepened, and the patient died three days afterwards. The membranes and cortex of the brain were found healthy, but on detaching the bulb from the cord, some drops of pus escaped. The lateral ventricles were found distended by an abundant collection of purulent liquid, which distended the Sylvian aqueduct and the fourth ventricle. The choroid plexuses were covered by purulent shreds, and in the left hemisphere the nucleus caudatus and the top of the thalamus opticus contained an abscess of the size of a filbert, while a larger abscess was found in the centre of the left occipital lobe.

Truckenbrod[132] has recorded a case of abscess of the brain after *otitis media*, which was cured by operation.

The patient was 54 years old, and had been otherwise in good health, but showed a scar resulting from an old hard sore. He had otitis media acuta sinistra after an attack of grip. Three weeks after the beginning of the symptoms there appeared suddenly severe pain in the vertex, with aphasia, alexia, paresis of the right arm, and deviation of the mouth. The temperature was irregular, now and then rising to 102°. An abscess in the left temporal lobe was diagnosed and opened from the antrum. In four weeks the patient was well; the perforation of the membrana tympani had closed, and the hearing was as good as before the operation. The patient, however, remained incapacitated for prolonged mental efforts.

Weichselbaum[3] has in ten autopsies of cases of grip found nine times accumulations of pus in the accessory cavities of the nose. In one case this pus had spread to the dura mater, and caused meningitis with a large abscess in the frontal lobe of the brain, which had broken through into the lateral ventricles. In the pus capsulated cocci were found, which showed extreme virulence.

Aczél[133] has described the case of a man, aged 32, who fell ill with catarrhal grip, but continued to complain of severe headache after the catarrh was gone. A fortnight later delirium set in, and the diagnosis of "tubercular meningitis" was arrived at. The patient

died shortly afterwards, and the autopsy showed no meningitis, but an abscess of the size of a filbert in the left præfrontal and parietal lobe, corresponding to the median portion of the central sulcus. There were also found purulent bronchitis, and abscesses in the tonsils.

Another case of abscess in the left præfrontal lobe is recorded in the report on Influenza in the Prussian Army, compiled by order of the Ministry of War.[134]

5. *Embolism and Thrombosis.*

Embolism of an important cerebral artery may occur quite in the beginning of the malady through the coalescence of a number of small thrombuses circulating in the blood. Leichtenstern[126] has spoken of this condition as *apoplectic influenza*, and has recorded seven cases, two of which proved fatal, while three recovered, and in two others there remained permanent hemiplegia of the affected limbs. The condition is, therefore, one of extreme gravity. Senator[124] has seen two similar cases, one in a woman aged 27, and another in a man aged 33, in whom fatal apoplexy occurred soon after they had become gripped. A focal lesion was discovered in the left cortex, with numerous capillary hæmorrhages and small abscesses in the neighbourhood. Fürbringer[125] has seen a similar case.

Case VII.—In the following case which came under

my notice in June, 1891, there could be very little doubt that we had to do with a case of embolism of the middle cerebral artery owing to grip. The patient was a decorator, aged 52, married and father of two children, and had been in good health until April, 1891, when he had an attack of influenza. He had severe fever, headache and backache, and a feeling of utter prostration. On the eighth day of his illness he was quite suddenly seized with intense giddiness, followed by loss of consciousness. He remained unconscious for thirty-six hours, and when he came to it was found that he was speechless, and had lost the use of the right side. I saw him three months later, when he had nearly recovered from the attack. He spoke with only a slight impediment, and did not complain of headache or giddiness, or impaired memory. He walked fairly well, but the knee-jerk was exaggerated. The principal symptom for which he consulted me was an awkwardness in the use of his fingers, which prevented him from resuming his occupation. There was no actual paralysis nor rigidity in the right upper limb, but the tendon-reflexes were considerably increased, and there was some loss of power in the flexor muscles. The dynamometer showed 130° on the left side and only 65° on the right. There was also a degree of anæsthesia of the sense of touch, but no analgesia. A mitral murmur was present, and from the history of the case I con-

cluded that the patient, who had been in robust health previous to grip, had had endocarditis during the feverish attack, and that an excrescence had become detached from the valves, and been lodged in the left Sylvian artery.

In another case of cerebral trouble which I have had for some considerable time under my care, the symptoms pointed to thrombosis of some of the blood-vessels of the ~~right~~ left (erratum) cerebral hemisphere.

CASE VIII.—This was the case of a single lady, aged 46, for whom I was first consulted in March, 1890. It appeared that she had on the whole enjoyed fair health until about six months ago, when the catamenia began to be irregular, and she suffered frequently from headache and giddiness. She had had influenza a month before, and although the fever left her in a few days and she had no bronchial or pulmonary complications, her head became very much worse. There was a settled pain in the left side of the cranium, chiefly above the brow and on the vertex; and this region was so tender that it was almost impossible for her to have her hair brushed. Her speech had at the same time become affected; she was apt to get very confused in expressing herself, and often used wrong words. She likewise complained of a sensation of numbness in the right side of the body, and there was so much loss of power, more especially in the right arm, that the limb was of very

little use to her. She had the greatest difficulty in writing, eating, dressing, etc., and had also lost power in the right leg. The knee-jerk was exaggerated on both sides, but more especially so on the right. There was insomnia and loss of appetite, and the action of the bowels was sluggish. The heart's sounds were feeble, and the pulse 48. I therefore concluded that there was thrombosis in the blood-vessels of the left hemisphere, and treated her with perchloride of mercury and iodide of potassium, and the constant galvanic current to the left brow and the medulla oblongata. The patient improved considerably under this treatment, when in May of the same year she had a second attack of influenza, which was rather worse than the first, and in consequence of which she lost all the benefit she had previously gained. A third attack occurred in December of the same year, and her life was then for some time in great jeopardy. She rallied, however, slowly, but the symptoms of dysphasia and paresis had become greatly increased, so that she was for a time perfectly helpless. She improved to some extent by further treatment, but was still a great invalid when I last saw her (January, 1892).

Case IX.—In February, 1892, I saw an unmarried lady, aged 25, who came from a neurotic stock, but had enjoyed good health until about twelve months ago, when she was suddenly seized with an acute pain at

the bottom of the spine, which proved very obstinate. Two months before she came to me she had had a somewhat irregular attack of gastric influenza, which left her in a state of the greatest prostration. At present the symptoms appeared to be owing to starvation of the left hemisphere from incomplete thrombosis of the middle cerebral artery. There had been no sudden attack of paralysis, but speech and the other mental functions, more especially the memory, were greatly impaired. She was utterly unable to read a book, or to write a letter, or to cast up a column of figures. There was paresis of the right side, as she had almost completely lost the use of the right arm and leg. The tendon reflexes in both extremities were considerably increased. The right hand was so weak that the patient could hardly grasp the dynamometer, and was quite unable to make the index move a single degree. She had a sensation of pins and needles in the right arm, but no anæsthesia. Standing and walking were almost as bad as we see it in a patient who has had a regular attack of hemiplegia. I should add that there was not the slightest symptom of hysteria in the case.

C.—Post-Grippal Diseases of the Spinal Cord and its Membranes.

Appleton, quoted by Streeten,[134] mentions "inflammation of the spinal marrow having occurred, during the

epidemic of 1836-37, in some cases which had not received early attention," but no clinical details or autopsies are given. During the late epidemics, however, cases of spinal disease, which were unquestionably owing to grip, have been seen by a number of observers.

An interesting case of cervical meningo-myelitis is described by Mackay.[46] The patient was a married woman, aged 38, the mother of seven children, who became gripped in July, 1890, when in the second month of pregnancy. This was accompanied by intense neuralgic pains in the back of the neck. The pain extended from the seventh cervical vertebra up to the vertex, radiated outwards to the shoulders, and was sometimes so intense that the patient walked about her room all night. After the pain had continued for a fortnight, gradual loss of power appeared in the right hand; a few days later the right arm became weak; then she lost power in both legs, and could not walk upstairs. Sensory symptoms, with the exception of the pain, did not appear at this stage. Mackay first saw the patient on September 18th, when she had an anxious expression, was lying on her back with the head fixed, and could only move it with great pain, which was most severe between the fifth and seventh cervical vertebra. Temperature 99·6°; respiration, 32; pulse, 98. She had a very feeble grasp, especially with the left hand; the arms and hands were

much wasted, the electric excitability diminished; the power over the legs was very feeble. The knee-jerk was exaggerated, and ankle-clonus readily obtained. There was numbness in the finger-tips, where the prick of a pin was not felt. Under treatment the pain subsided, and the muscles of the arms became stronger; but there was obstinate morning sickness. In October the neuralgic pains returned, and there was a swollen gland in the sterno-mastoid region. The temperature varied between 99° and 101°, but never became normal. The patient gradually lost more strength, and in November complained of difficulty in breathing. The diaphragm appeared paralysed, the breathing was laboured, and most accessory muscles were in action. The left arm was now completely paralysed, the right paretic, and the legs also paretic. The next day she became comatose and died.

On opening the cervical canal, the cord was seen distinctly swollen; the dura mater was injected and in parts thickened and opaque; the vessels of the pia were likewise injected; the dura was adherent to the vertebral bodies and the cord, there being a tough layer of fibrinous exudation. The cord was soft, pulpy, and, higher up, completely disintegrated. The nerve-trunks of the left side appeared wasted when compared with those of the right. The microscopic examination showed the usual constituents of myelitic débris.

Foa[136] describes the case of a middle-aged woman who had a bad attack of influenza with pneumonia, of which she died. The fresh cord showed to the naked eye intense hyperæmia of both substances, and red points in certain sections. After hardening there appeared two kinds of focal lesions, both principally in the upper portion of the cervical and the two upper thirds of the dorsal cord. There were hæmorrhages which had pushed the nervous elements aside, but in most foci there was hypertrophy of the cylinder axis, which was thickened to about five or six times its usual width. This was found chiefly in the lateral columns, more especially in the cerebellar tracts.

Laviran[137] has seen a case where grip was complicated with right-sided pneumonia. On entering the hospital the patient had complete paraplegia. The paralysis invaded rapidly the upper limbs and the bulb, and the patient died of asphyxia. The cord, which was only examined cursorily, showed signs of inflammation.

Feréol[138] mentions a case of *acute ascending myelitis* in a country practitioner, who had been very much overworked, and was addicted to the habitual use of morphia previous to the attack of grip, which was complicated with bronchitis. During convalescence paraplegia supervened, which eventually spread upwards to the bulb, and led to a fatal result.

Bidon[37] reports the following case as one of spinal meningitis (?). A music-hall singer, aged 27, had influenza in January, and had ever since suffered from pain in the loins. A week afterwards she entered the hospital, walking with two sticks and being almost doubled up, as she was unable to raise the feet without much pain. There was severe pain on the sides of the vertebral column, more especially at the level of the last dorsal and first lumbar vertebra, very much aggravated by the least movement. She was unable to turn over in bed, the lower limbs were feeble, but not paralysed or rigid. She had no trouble with the sphincters. She was treated with *pointes de feu*, blisters, and purgatives, under which treatment she gradually improved, although when last seen she was not nearly well.

Sclerosis of the Spinal Cord.

The different forms of sclerosis of the spinal cord may occur after grip, either as primary sequels, or at a later period, and after other neurotic affections have appeared and vanished again, thus showing a further analogy in the action of the poison of grip with the syphilitic virus, which both appear, therefore, to be able to cause *not only secondary but tertiary lesions.*

Case X. *Hemi-Anæsthesia followed by Spastic Spinal Paralysis.* — One of the most interesting cases of this kind which have fallen under my observation was that of

a labourer, R. C., aged 30, married and father of three children, who was, during my absence from town in September, 1890, admitted into the hospital under the care of my colleague, Dr. Guthrie, to whose kindness I owe the following notes of what I will call the *secondary* post-grippal affection, which came on shortly after the patient had been convalescent from influenza. This man had been in thoroughly good health, was an abstainer, and had never suffered from syphilis, when he was seized with influenza in January, 1890. The principal symptoms were fever, with severe pain in the back of the head and the loins. He was in bed for ten days, after which he went to work again; but in a short time noticed a feeling of numbness, beginning in the fingers of the left hand, and which gradually spread up to the left arm and shoulder. Two or three weeks later there was loss of power in the left fingers and wrist, and later on also in the muscles of the shoulder. The numbness then spread to the left leg, the gait became difficult, and the left foot dragged. All these symptoms gradually increased up to May 12th, when he had a severe attack of pain in the left side of the neck, face and head, which was of a shooting and gnawing character, and worse at night. He was unable to lie on the left side of the face; and there was also pain in the left shin.

The patient was admitted on September 11th, 1890,

when he was found to be healthy-looking, fairly well nourished, and with no wasting of any part. The principal symptom was then almost complete anæsthesia of the left side of the face, neck, and body as far as the nipple line, where neither touch nor prick of a pin were perceived. The shoulder and arm were also anæsthetic as far as the elbow. The anæsthesia ended abruptly in the middle line. Below the elbow sensation was present, but greatly diminished when compared with the right side. The patient was very intelligent, and his statements did not vary, however much he was cross-examined. The sense of taste was blunted on the left side, but hearing and sight were good; the pupils were somewhat dilated, but reacted well to light and accommodation. The discs were normal. There was profuse sweating on the left side of the face, neck, and trunk, while the right side was dry and cool. The temperature was a degree higher (97·6°) in the left than in the right axilla. The knee-jerk was exaggerated on both sides. There was ankle-clonus in the left, but not in the right foot; and the left triceps and wrist reflexes were increased. The grasp of the left hand was very weak; the elbow semi-flexed, and inclined to be rigid in handling; but there was no actual paralysis in flexion or extension. He could, however, not raise the arm beyond the shoulder-level, nor touch the top of his head with his hand. The gait was awkward; he came

down heavily on his heels, but there was no paralysis, and Romberg's symptom was absent. The electrical tests were normal.

Under treatment the patient gradually improved, and when I examined him on my return to town in October, 1890, I found that sensation and all the other functions appeared normal, so that he could be "discharged cured." He returned home to his work, and I was informed from time to time that he continued quite well. Imagine my surprise when the patient presented himself again at the hospital in April, 1891, in a very much worse and totally different condition than he had been in before. It appeared that he had remained quite well from the time of discharge until about the middle of March, 1891, and had been able to do his work all the time, when suddenly he began, without any apparent cause, to feel so weak and out of sorts that he was obliged at first to restrict, and at last quite to give up his work, and had to take to his bed. On examining him I found all the symptoms of fully developed spastic spinal paralysis, which from the account given appeared to have only commenced a fortnight ago. He could neither stand nor walk without being supported on both sides, and had entirely lost the use of his arms and hands. He could just drag his feet along the floor with assistance, but unless supported would have come down at once. All the tendon reflexes were enormously

exaggerated; indeed there was not a single point on any one of the four extremities where slight percussion did not at once elicit an extraordinary response by violent jerking of different groups of muscles. When asked to stretch out his left arm, intense sclerotic tremor of the limb became perceptible. This was much less marked in the right arm; indeed the whole left side, which had been the first to suffer before, was much more severely affected than the right. The left deltoid muscle was almost completely atrophied, and so were the muscles of the left thumb; the muscles of the shoulder, and the other muscles of the left arm, were also greatly wasted. There was somewhat less wasting in the right arm, the muscular atrophy in the two lower extremities being about equal. The faradic and voltaic responses of the shreds of muscular substance which still remained were greatly exaggerated. The patient could not hold, much less squeeze the dynamometer. Sensation was unimpaired in all parts. The bladder acted somewhat feebly, and there was occasionally incontinence of the urine. The bowels acted tolerably well. The sexual force was entirely lost. The reflexes of the facial muscles were increased. The pupils acted to light, and the discs were normal; the voice was extremely feeble, so that he had a difficulty in making himself understood, and the action of the laryngeal muscles was much impaired. The ocular muscles acted normally, and the

patient's memory and other mental faculties did not seem in the least affected. The pulse was filiform, 120, and occasionally irregular. The heart's sounds were very feeble, but pure; the breathing normal, and the lungs unaffected. The urine had a density of 1010, was feebly acid, and contained a large excess of phosphates, but no albumen or sugar.

The patient was now readmitted into the hospital and underwent treatment, chiefly by arsenic, iodide of potassium, and electricity. After about three months he showed some degree of improvement, the tendon reflexes not being so violent, and the voluntary control over the muscles somewhat greater. Yet, when I sent him, about Midsummer, to a convalescent institution at the seaside, the symptoms of amyotrophic lateral sclerosis were still well marked, and the prognosis as to eventual recovery appeared most unfavourable. Here, therefore, we had to do, first, with a feverish attack of grip, then with a secondary and evidently functional form of hemianæsthesia, followed about six months afterwards by a severe organic lesion of the spinal cord, which only slightly improved under treatment, and is likely to leave the patient disabled for life! Influenza was in this instance evidently the prime mover, for there was no history of inherited or acquired neurotic predisposition, nor of alcoholism, syphilis, injury, or any other hurtful influence whatever.

I have seen two other cases of spastic spinal paralysis, in which the affection had become fully established within three months of the feverish attack of grip.

The following is a case in which influenza led to the outbreak of another spinal affection, although the fact that the patient had had syphilis many years ago undoubtedly constitutes a difference from the case of R. C.

CASE XI. *Progressive Locomotor Ataxy.*—A gentleman, aged 70, married and childless, whose income had been very much reduced, and who had had a great deal of trouble and annoyance of late years, but who had in spite of this enjoyed very good health, had influenza in January, 1890, which kept him in bed for four days. The principal symptoms were shivering fits, fever, and intense backache. After the fever had subsided, he attempted to get up, but felt as if he had lumbago, being unable to rise or move about without great pain. This went on for some time, and he was confined to his room for another fortnight. Eventually, however, the backache left him, and he resumed his ordinary mode of life. He appeared, however, to have aged considerably since the attack of influenza, and in July, 1890, noticed that walking as well as standing became increasingly difficult. During the last few weeks he had also noticed a strange feeling in his hands, and had great difficulty in writing and dressing himself.

I first saw him in October, 1890, when, on his entering my room, I at once recognised the gait peculiar to locomotor ataxy. I found loss of the knee-jerk, Argyll-Robertson's pupil, and Romberg's symptom of swaying when the eyes were closed. There was loss of power in the bladder and bowels, while the sexual power had been impaired for some years past. There was no anæsthesia except in electro-muscular sensibility to both forms of current; but the patient was very sensitive to cold. He had had syphilis when he was 21, but had never been troubled by it except the first six months, when he had suffered from a pretty sharp crop of secondaries. There was, therefore, an interval of nearly fifty years between the attack of syphilis and the outbreak of tabes; and it seems most unlikely that the spinal affection would have occurred at all, if the power of resistance of the nervous system had not been undermined by the attack of influenza. The latter must, therefore, be credited with having been at least the exciting cause of the tabes in the present instance; and considering the unusual length of time which intervened between the two diseases, it might even be considered to have acted as the pathogenic cause as well.

The following is a somewhat analogous case, but differs in localisation :—

Case XII. *Cervical Tabes.*—A merchant, aged 45, had a chancre fifteen years ago which lasted about three

months, and was followed by a tiny crop of secondaries, which disappeared in a few days without giving any trouble. He had ever since been in good health, had married, and become father of three healthy children, his wife having had no miscarriages. In December, 1889, he had an attack of influenza, which lasted three weeks, the principal symptoms being an irregular and relapsing kind of fever, with headache and backache, and severe pain in all the limbs, but principally in the upper extremities. The patient remained for about three months after the attack in a low and prostrated condition, after which, however, he gradually seemed to regain his usual health. In June, 1890, that is, six months after the attack of grip, he commenced having, apparently without any particular cause, curious chilly feelings in his arms and hands, more especially about the elbows, and found that he had a difficulty in carving a joint, in dressing and writing. Two months after this he had a severe attack of neuralgic pain in both upper extremities, which lasted for about a week, and left him in a very prostrate condition. The difficulty in the use of his hands having in the meantime increased, he came to consult me in October, 1890, when I found that the sense of touch in the fingers and hands was greatly impaired, there being also some degree of analgesia and retarded sensation, as he required about four seconds to realise an impression which had been made. All the

deep reflexes of the upper extremities were lost, and there was decided ataxy of movements, more especially when the eyes were closed, as the patient went very wide of the mark when I asked him to put his first finger on the tip of his nose, etc. His handwriting had changed to such an extent that his friends did not recognise it, and the act of writing was so awkward that the patient had taken to dictate his letters, and merely affixed his signature. On the other hand, the muscular force was good, the dynamometer showing 140° in the right, and 125° in the left hand. There was Argyll-Robertson's pupil, and paresis of the rectus externus of the right eye. The discs were normal. There were no symptoms below the waist. The bladder, rectum, and sexual organs were quite efficient, and the patient could walk from eight to ten miles with comfort. The knee-jerk was normal.

In June, 1890, I saw another case in which the localisation of the sclerotic process was again different, and which was distinguished by the symptoms having come on almost immediately after the attack of grip:—

Case XIII.—*Postero-lateral Sclerosis.*—A tradesman, aged 41, married, had been in good health until Easter 1890, when he had an attack of influenza, which kept him in bed three days, the principal symptoms being fever, backache, and pain and stiffness in the lower extremities. On going out of doors for the first time

after he was convalescent, he felt extremely chilly, and was, in the evening of the same day, taken with severe pain in the legs, which kept him awake the whole night. The day after he saw double, and complained of a mist before his eyes, and of painful micturition. Within the next few days he lost a good deal of power in the legs, and felt difficulty in walking and standing, especially in the dark. He also complained of a tight feeling across the stomach and round the knees. After a time the pain spread to the arms and hands, and numbness was felt in all the limbs. On my first interview with him, on finding signs of spinal disease, I inquired carefully about any previous syphilitic affection, which he might have had. The patient, however, strenuously denied having had either syphilis or gonorrhœa, and stated that his habits had always been steady, and that he had never touched a woman before he was married. Nor was there any history of injury, or of inherited neurotic tendency. There was paresis of the left rectus externus, commencing optic atrophy, a degree of anæsthesia in the limbs, and Romberg's symptoms, while the knee-jerk was much exaggerated in both sides. The patient was unable to do any work, and felt extremely depressed, more especially as the lightning pains continued to be perfectly awful, raging night and day without intermission, shooting, stabbing, tearing, and splitting, so that he had no rest either night or day. The symptoms of

the case having come on so suddenly, the case looked at first sight like one of multiple neuritis (pseudo-tabes); but this idea was negatived by the presence of paralysis of the rectus externus, of optic atrophy, and of the exaggerated knee-jerk, which necessitated the diagnosis of postero-lateral sclerosis.

Leichtenstern[126] mentions a case in which "girdle-pain," and violent pain in both legs, appeared in a patient after an attack of influenza. The tendon reflexes were enormously exaggerated, but there was no trouble in the sphere of sensibility. There was ataxy in walking, with loss of motor power; incontinence of urine and cystitis. The case, however, did well.

Herzog[139] has seen the case of a boy, aged 11, whose family history was unimportant, but who had stammered a little since he began to talk, and who had had pneumonia twice, three and five years ago. In December, 1889, he had influenza, with chiefly gastric symptoms, and coryza for about eight days. After this time he suffered paroxysmally from pain in the stomach, always at night, and which was so severe that he was unable to sleep. On February 10th a small fibroid tumour was removed from under the nail of the left big toe, under anæsthesia. The night after this, severe pain in the wound was complained of; the wound, however, healed well and became quite painless. About a week afterwards there was loss of power in the legs; a fortnight

subsequently he could hardly lift the feet above the ground, but could walk unassisted. In three more weeks there was complete paralysis of the lower extremities, and also loss of sensibility, anæsthesia and analgesia. He also complained of cramp in the legs, which were spasmodically jerked about. There was occasionally incontinence of the excreta, but no pain. The muscles were not wasted, but the tendon reflexes highly exaggerated, and there was great diminution of faradic and galvanic excitability. He could not sit up in bed or on a chair. He had slight scoliosis, but no tenderness on percussion of the head or spine. The urine, after a time, was constantly dribbling away; it did not contain any albumen. Incontinence of the bowel likewise became habitual. There was at last anæsthesia and analgesia in front up to the navel, and behind, at the level of the twelfth dorsal vertebra. Above the anæsthetic zone there was hyperæsthesia.

It was hardly possible to credit the small operation on the toe with being the cause of the spinal symptoms ; for the cicatrix was not at all tender, nor was there ever spontaneous pain in the lower extremities. It was apparently a case of myelitis transversa, probably limited to a small area.

Many observers have noticed considerable deterioration in the condition of patients suffering from chronic spinal disease, through an attack of grip. A gentleman

who was under my care during the better part of the year 1891 had nearly recovered from the symptoms of tabes when an attack of grip about Christmas last suddenly threw him back into a very helpless condition. Almost all my patients affected with spinal sclerosis who have had grip have had to complain of an increase in the severity of lightning pains, and greater difficulty in walking and standing.

Bidon[37] mentions the case of a woman, aged 38, who had for the last ten months suffered from "diffuse myelitis." There was paraplegia, the left leg being worse, with rigidity and cramp, more especially in bed; retention of urine, and weakness in the arms. The patient complained of constant feelings of pins and needles, with occasional lightning pains in all the limbs, and of "girdle-pain." The tendon reflexes were lost, and the muscles wasted. She had an attack of influenza which commenced with violent headache; when all her previous sufferings were much aggravated. The cramps were constant, and there was such hyperæsthesia that she could not bear to be touched. Lightning pains appeared in the sphere of both fifth nerves. The temperature was 103·6°, the pulse 128; there was suppression of urine and sub-delirium. Under the influence of treatment the patient improved, but she presently became very much weaker. The lower limbs were quite paralysed, the arms had lost their power, and

she could not sit up for more than a few minutes. Indeed, the influenza had undoubtedly intensified the myelitis. Since then everything had become worse, the legs more powerless and painful; the arms, which were only slightly affected before, were getting paralysed; the pain was so bad as to cause insomnia, the numbness was greater, and incontinence of the urine was habitual.

Villard[140] mentions the case of a woman, aged 35, affected with tabes and suffering from pain and loss of power, but being able to walk with the aid of a chair. On the outbreak of influenza she had such violent pain in the dorso-lumbar region, and in fact the whole spine as well as the lower limbs, that for a week nothing could ease her. This gradually lessened; but since her recovery from grip the patient has been completely paralysed in the lower limbs, and paretic in the upper.

D.—Diseases of the Peripheral Nerves.

Hyperæmia and neuritis of the peripheral nerves have been frequently noticed as complications and sequels of influenza. Indeed Sansom[141] appears to be of opinion that all the sequels or remote consequences of grip may be explained "by a peripheral neuritis affecting the sympathetic ganglia and nerves, the vagus, and the sensori-motor nerve trunks." This view, however, cannot be

accepted, seeing that the post-grippal psychoses, and the cerebral and spinal affections which I have just described, are purely central diseases.

I. *The Cranial Nerves.*

1. *The Olfactory Nerve.*—Whether true olfactory neuritis has occurred as a complication or sequel of grip is not known. Loss of smell and taste are indeed very common during the feverish attack, and for some time afterwards; but this occurs more especially in cases where there is much catarrh in the mucous membrane of the nose and adjacent cavities, and where it may be assumed that the expansions of the olfactory nerve lose their function from being compressed by the purulent secretion. Smell and the perception of flavours, therefore, generally return shortly after convalescence. Leichtenstern and Senator, however, have seen cases which have proved very obstinate and mended slowly, and where therefore actual neuritis may have occurred.

2. *The Optic Nerve and the Motor Nerves of the Eye.*—These nerves are liable to a variety of diseases through grippal infection, which it will, however, be more convenient to describe in the section devoted to diseases of the eye (Section F).

3. *The Fifth Nerve.*—Neuralgic pain in the sphere of

the supra-orbital nerve is one of the commonest complications and sequels of grip. The second and third divisions of the fifth nerve are not so frequently affected. The pain is of the true neuralgic type, and follows the anatomical distribution of the nerve. Amann[142] has seen this in forty per cent. of all his cases. The pain is owing to neuritis acutissima, which may affect the nerve primarily, or the inflammation may spread from the periosteum of the bony canals through which the nerve has to pass, to the sheath of the latter. A case of this latter kind has been recorded by Ewald.[51] Sansom[141] has seen a man, aged 38, who had intense supra-orbital neuralgia, varying from side to side. Sometimes the neuritis has appeared to be connected with a previous syphilitic infection, which was evidently revived by the feverish attack of grip.

Holtz[73] describes the case of a man, aged 35, who, after influenza, was taken by intolerable headache, rendering every occupation impossible, and resisting treatment by antipyrine and exalgine. After a time the pain assumed the form of neuralgia of the first and second branch of the fifth nerve, without tender points. Treatment of every kind had apparently no effect whatever, and the patient was so tortured with pain that he felt as if he must go mad if it continued any longer. He was extremely depressed, and had no sleep at all. On further inquiry it appeared that he had had a

chancre fourteen years ago. Iodide of potassium was now given, and in three days the pain was completely relieved.

Frankl-Hochwart[143] has seen a number of cases of neuralgia of the fifth nerve, which appeared within a week or so after the feverish attack, and which yielded in a very short time to faradisation by means of a wire-brush. It must, however, not be supposed that all cases are so rapidly amenable to treatment, for some are very obstinate and apparently defy the most energetic remedial measures.

The following is a case in which a patient who had been cured of tic-douloureux about three years ago, had a bad relapse of it shortly after having been gripped :—

Case XIV. In March, 1888, a clerk, aged 42, applied at the hospital for advice on account of neuralgia of the face, which had come on in consequence of his having been employed as engineer in mining operations, and being occupied with the blasting of rocks. The concussions resulting from the explosions of dynamite are so severe as to cause a variety of nervous affections, more especially epilepsy, amongst the men. This patient became affected with neuralgia in the first and second branch of the fifth nerve, which gradually increased so much in severity that he was unable to continue his avocation. The symptoms of epileptiform

neuralgia were well marked, there being the usual tender points at the exit of the nerves, while the pain was excessively keen, and much increased by eating and talking. The patient remained under treatment for about three months, and had then apparently quite recovered. I saw him again in July, 1891, when he informed me that he had been perfectly well ever since, until he had a sharp attack of influenza about a month ago He had severe fever, backache, and pain in all the limbs; and he had been unable to sleep ever since. The pain in his face had returned with all its old severity about a fortnight after the feverish attack, and he was then, indeed, completely disabled by it. There were tender points in the supra-orbital, infra-orbital, and temporal nerves. The patient was worn out with pain, sleeplessness, and want of food, the latter being partly due to anorexia, left by influenza, and partly to the pain caused by mastication. He recovered by a comparatively short treatment.

Anæsthesia in the sphere of the fifth nerve appears to have been rare. There is loss of sensation, with a feeling of numbness. Frey[147] has described a case of complete anæsthesia of the lingual nerve, in which there was loss of ordinary sensation in the tongue, as well as complete loss of taste.

4. *The Portio Dura* is rather apt to suffer through grippal infection. I have seen a case of bilateral

neuritis[148] of it, which I exhibited before the Clinical Society of London on May 23rd, 1890.

Case XV. *Bilateral Facial Palsy.*—A clerk, aged 45, had had no syphilis, was temperate, and had not in any way exposed himself to wet or cold recently. His illness began with severe pain in the body and limbs, which was particularly bad at night, and prevented sleep. There was no fever, but much prostration. This condition had lasted about three weeks, when one morning he found that he had a difficulty in talking and eating, that the food seemed to have lost its flavour, and that his face had become fixed. His friends hardly recognised him, and told him that he looked as if he had been turned into stone. When I first saw him, in April, 1890, his expression was statuesque and the features completely immoveable, while the muscles of the eyes and of mastication acted normally. There was so much epiphora that the patient could not read; he could not sniff, and therefore had lost his smell, so that he did not taste his food; nor could he smoke, as the paralysis of the lips prevented him from drawing the smoke from the pipe. Although he had the use of the muscles of mastication, eating was, through paralysis of the buccinators, so much impeded that it took him about a quarter of an hour's hard work to get a bit of fish or bread-crumb down, as the morsel kept falling out of his mouth; he therefore at last took nothing but

liquids, and even the better part of them ran down his chin. His body weight was much reduced in consequence. Articulation was almost impossible; he could only jerk, as it were, the words out of his throat, so that he had much difficulty in making himself understood. The electric tests were those of the "reaction of degeneration." In this case it was not easy to ascertain the cause of the neuritis. The pain which was so severe in the beginning of the illness resembled that of sub-acute rheumatism, and the facial palsy looked at first sight as rheumatic neuritis. But as there had been no exposure to cold and wet, and the case occurred while the epidemic of grip was raging in London, it appeared more probable that the neuritis was owing to grippal infection. I therefore concluded that the severe pain in the body and limbs was due to poly-neuritis, which, although causing great trouble in the sphere of sensibility, was not sufficiently intense to cause motor paralysis, except in the portio dura, where for anatomical reasons, the pressure of the effusion on the nervous matter was greater than in other parts. As to localisation, the seat of the lesion was evidently not central, that is, between the cortex and the pons, because in central facial palsy only the muscles of the mouth are much affected. Nor could it be at the base of the brain, for in such a case there would be deafness from simultaneous affection of the portio mollis, while

there would be no loss of taste, which in this case was complained of, inasmuch as the portio dura only contains gustatory fibres during its course in the Fallopian canal. There was no hyperacusis, showing that the Stapedian nerve had escaped, and I could therefore localise the seat of the lesion in the lower portion of the Fallopian canal, where the chorda tympani enters the trunk of the nerve.

I have also seen a few cases of unilateral neuritis producing paralysis of the portio dura which were clearly owing to grip-infection. One of them was interesting because it showed the symptoms of hyperacusis, which is owing to paralysis of the Stapedian nerve, and denotes the seat of the lesion in the highest portion of the Fallopian canal.

CASE XVI. *Facial Palsy with Hyperacusis.*—A tradesman, aged 29, married, consulted me in October, 1890 for paralysis of the right portio dura, which had come on in May of the same year, directly after a sharp attack of influenza. His health had lately been good, but he had at various times suffered from rheumatism, and six years ago had had "inflammation of the brain (?),' which kept him in bed for two or three weeks. The feverish attack of grip only kept him in bed one day. The following day, feeling rather better, he got up and did a little business; but this caused a relapse, and he had to go to bed again, and was then laid up for a week.

Soon afterwards he found one morning that he could not close his right eye; he did not taste his food properly, and his hearing on the right side was painfully acute, so that the least noise distressed him, and it appeared to him as if people who were talking to him in the usual way shouted at the top of their voices.

On examining him, the right portio dura appeared to be completely paralysed. The forehead was smooth, he could not frown, shut his eye, sniff or whistle, or taste anything. He complained chiefly of being unable to smoke, to taste his food, and to kiss his wife. The ageustia and hyperacusis, which were marked, showed that the chorda tympani and the Stapedian nerve were both implicated in the paralysis, and that the case was, therefore, one of neuritis of the portio dura in the highest portion of the Fallopian canal. I prescribed for him, and advised a course of electrical treatment, but when the patient came to see me again about four months afterwards, I found him exactly in the same condition as before. It appeared that he had neglected to follow my advice about the electricity. One often hears the opinion expressed that facial palsy always gets well of itself in course of time, and requires no particular treatment. The case just related, to which I could add many others, shows that this is far from being so. Cases which spontaneously recover are in general only those where the extra-cranial part of the portio dura is

affected. Such was probably a case seen by Feige[149] where the paralysis appeared a few days after the feverish attack, and lasted as long as the grip itself. In that case the palsy disappeared without treatment.

I have seen several other cases of facial palsy from grippal infection which I will not narrate, because they did not present any unusual features. I will, therefore, only add that in one case the affection appeared on the fifth, in another on the sixth, and in the third on the tenth day of the illness, no exposure to cold having taken place in any of them, as the patients had not left their beds at the time the nerve became paralysed.

Spasm in the sphere of the portio dura—*tic convulsif*—has also occurred in consequence of influenza. Bidon[37] mentions the case of a woman, aged 52, who had influenza with broncho-pneumonia, and during convalescence was taken with a tonic spasm of the left portio dura. The eye was habitually very nearly closed, the nose drawn to the side, and the corner of the mouth raised, while the wrinkles in the affected side of the face were deeper and more marked than in the other. The left side also felt harder. Once or twice every minute there were superadded to this clonic convulsions of the left side of the face, by which the eye was more firmly closed and the mouth more drawn up. The spasm persisted at the time the patient left the hospital.

5. *The Auditory Nerves.*—The affections of this nerve

will be considered when treating of the post-grippal diseases of the ear (Section G).

6. *The Pneumogastric Nerve.*—Anæsthesia and paresis of the *pharyngeal* and *œsophageal* plexuses of this nerve, which are so often met with after diphtheria, are not very common after grip. Joachim[150] has seen paralysis of the soft palate after influenza in a woman aged 36, who certainly had not had diphtheria. On the tenth day of the feverish attack she became affected with nasal speech and regurgitation of fluids through the nose. Heymann[151] reports the case of a patient, aged 12, who acquired bilateral paralysis of the soft palate after grip, and was cured by faradisation of the affected part. Jankau[152] has likewise seen paralysis of the soft palate in a patient, in whom it was combined with ozæna and otitis.

Laryngeal Paresis is likewise not very frequent after grip. I have seen several cases of aphonia, coming on quite suddenly, without inflammation or other obvious causes, and resembling ordinary hysterical aphonia with temporary paralysis of the adductors of the vocal cords. Cazeaux[153] describes the case of a girl aged 21, who had had a few slight attacks of temporary (hysterical) aphonia, but had otherwise been in good health until she became gripped in December, 1889. She suffered during the feverish attack from dyspnœa with inspiratory stridor, and this persisted until July, 1890, when Cazeaux first

saw her. She then was constantly subject to a degree of dyspnœa, which was, however, occasionally increased to an alarming extent. There appeared to be no disease of the trachea, bronchial tubes, or lungs, but it was seen with the aid of the laryngeal mirror that the posterior crico-ary muscles were paretic, in consequence of which the glottis did not open properly during inspiration. Electricity and strychnine were used, and in three months the patient had recovered.

Revilliod[57] has seen a fatal case of *spasm of the glottis;* and spasmodic laryngeal *cough* of extreme severity is one of the most frequent sequels of grip. Its characters have already been described (p. 54).

Strange[154] mentions a peculiar vagus affection which he observed in February, 1890, during the severe epidemic of influenza which prevailed then in Worcester. The patient was an elderly medical man, previously in good health and entirely free from any heart affection, who was seized one day with a peculiar feeling of debility, with oppression of the cardiac region, but without any pain. He went about his work as usual, but it was with difficulty and languor. There was no cough or bronchial affection, and the appetite was as good as usual. On retiring to rest he felt deadly cold, and then, for the first time, felt the pulse, which was beating in the most irregular and feeble manner, about 20 only in the minute being felt at the wrist. The feeling was

entirely that of impending death, but there was no pain at or near the heart, and no sickness. In six hours the pulse became regular and much as usual. The next night there came on a violent spasmodic and exceedingly irritative cough, which lasted for several hours without intermission. The second and third nights were the same. This passing away, there supervened a violent gastric catarrh, which lasted for several days. The affection of each of the three divisions of the vagus nerve in turn left little doubt that grip, which was then prevailing, was responsible for the succession of symptoms. Cases in which the *cardiac branches* of the pneumogastric nerve suffered subsequently to the attack of influenza have been very numerous.

Case XVII. *Tachycardia.*—A gentleman, aged 35, married, had enjoyed thoroughly good health up to Christmas, 1889, when he had influenza, with which he was laid up for a week. He suffered from intense pain all over, but more especially in the cardiac region, and had great difficulty in breathing; but there was no cough or expectoration. When he was able to leave his bed, he found that the pain which he had had all along in the left side of the chest remained as bad as ever, and he was subject to palpitations on the slightest exertion, as when getting out of bed or rising from a chair. He came to me in July, 1890, when he was still quite an invalid. The pulse beat at the rate of 160, and showed

hardly any tension, as the slightest pressure stopped it. The patient complained of severe pain in the left side of the chest corresponding to the heart's region, but there was also pain in the right side. I quite expected to find pericardial effusion or valvular disease, but neither was present. Going upstairs and uphill caused a further increase in the velocity of the heart's action, and had several times led to fainting fits. Digestion was impaired, and there was a considerable excess of uric acid in the urine. There was utter prostration of strength, and although the patient had been for some months at the seaside to recuperate, he remained so weak that he was quite unable to follow his occupation. Not having seen him again, I know nothing of the further progress of the case.

Sansom[141] has described several cases in which pain, either persistent or paroxysmal, was referred to the region of the heart. In one of them it simulated angina pectoris. A gentleman, aged 31, typically athletic, who had never suffered from illness before his attack of influenza, which was very severe, was taken five months afterwards with sudden and violent pain at the heart, eventuating in syncope. He was standing with his back to the fireplace, talking with friends, when the attack seized him with violence, and he fell unconscious upon the hearth-rug. There was no epileptoid sign. Another attack occurred a week later. In the intervals no notable

deviation from health could be detected; the left ventricle was slightly hypertrophied, but not more so than could be expected in an athletic subject. The patient described the pain as of the character of a "grip" or "screw" at the heart; he experienced no coldness, and repudiated any sense of impending death. There were occasionally also some attacks of dyspnœa, occurring independently of exertion.

In some other cases, described by Sansom, there was a feeling of impending death, as in true angina pectoris, though the pain was much less severe. This occurred in a gentleman, aged 33, sixteen months after an attack of influenza. Pain referred to the heart, however, had occurred at intervals ever since his attack. In the case of another gentleman, aged 37, the sensation was described as of an arrest of the heart, as if the pendulum of a clock had been stopped at one swing. With this the patient said, "I feel as if I were going to die." In some cases there was a manifest slowing of the pulse; in others an irregularity. Sometimes a slow alternated with a quick pulse. In most cases the rate was rapid, but in none of Sansom's cases was the arterial tension unduly prolonged. This absence of prolonged arterial tension took the cases out of the category of true angina pectoris. None of these cases appear to have been fatal.

Angina pectoris has, however, occurred after influenza, just as it has been met with in the later stages of

other infectious fevers, such as diphtheria, septicæmia, etc., and has been connected with fatty degeneration of the myocardium, in consequence of preceding infections, inflammation of the muscular substance of the heart, and pneumonia.

Peter[155] describes the case of a merchant who had an apparently slight attack of catarrhal grip, and who was on the point of starting for a long journey, when he was suddenly taken with cough, headache, insomnia, and restlessness; the signs of hypostatic pneumonia became established, and the patient died quite suddenly the following night in a violent attack of angina pectoris.

A lady who had not had influenza herself, but all of whose relations had it at the time, was suddenly taken with intense pain in the præcordium, and called out, "I am going to die!" The skin became cold and clammy, the pulse was imperceptible, and there were all the other signs of collapse. Counter-irritants and stimulants were applied, and she revived. Such attacks occurred on three consecutive days; there was also occipital tenderness and pain in the region of the cardiac plexus.

Röhring[156] describes the case of a sergeant, aged 33, who had been in good health until an attack of influenza, after which he became subject to angina pectoris. There was dilatation of the right ventricle. He had suffered from attacks of pain in the left side of the chest, radiating into the left arm, and also from general debility

and depression. A similar case has been observed by Carageorgiades.[156a]

Sansom[141] has seen a number of cases in which pain at the epigastrium was nearly constant. In most cases the pain was paroxysmal, and frequently nocturnal, sometimes attended with vomiting or pyrosis. Peculiar symptoms occurred in some of these cases, as "a feeling as of a cold wind over the chest, and inability to take a deep breath." In some the signs of colic were closely simulated; frequently there was retching, but the tendency was rather to diarrhœa than to constipation. In one case, that of a man of 63 suffering from epigastric pain, with sense of heavy weight preventing sleep, and some vomiting, a small patch of herpes zoster was found below the angle of the right scapula.

7. *The Spinal Accessory Nerve.*

Case XVIII. *Torticollis.*—In April, 1891, Dr. Montagu Miller asked my advice about a married lady, aged 50, who had lost her catamenia about two years ago, and who had had a severe attack of grip in November, 1889. When this subsided, she was left with a very acute condition of left spasmodic torticollis, which caused a great deal of trouble. The head was constantly pulled to the side, and jerked about, or fell over, so that she had to support it with her hand. There was severe pain and tenderness on pressure at the back of the head and in the cervical spine. At night she had the greatest

difficulty in arranging her head on the pillow, and there was often so much jerking and pulling that she could not sleep at all. She had also lost power in the right hand and leg, and had in consequence "become left-handed." The patient had also lost her memory, and all the tendon reflexes were exaggerated.

8. *The Hypoglossus Nerve.*—Flatten[156b] has seen a case of complete paralysis of the right hypoglossus nerve in a lady, aged 45, who had been perfectly well previous to the attack of grip. The condition mended very slowly.

9. *Poly-neuritis of the Cranial Nerves* subsequent to influenza appears to have affected more especially the motor nerves of the eye, of which I shall speak in section F. The following is an instance in which the fifth nerve was affected in addition to two, and possibly all the three motor nerves of the eye:—

Case XIX. *Poly-neuritis of the third, fourth (?), fifth, and sixth Cranial Nerves, with Herpes Zoster in the Face and Eye.*—A lady, aged 56, was during the influenza epidemic, in January, 1890, suddenly seized with fever and severe headache. On the second day the headache was so intolerable that she became delirious, and a crop of vesicles filled with serous liquid was noticed on the left brow, temple, eyelid, and left side of the nose. The eye itself was very much inflamed and closed up. After a week or ten days the pain

subsided, the vesicles began to dry up, and the eye could be opened again, but the patient could see nothing with it. The eye continued blind for about two months, after which sight was gradually re-established to some extent. I first saw her in July, 1891, when vision was in the right eye $\frac{1}{1}$, in the left $\frac{1}{10}$. There was some degree of ptosis, nystagmus, and paresis of the rectus externus, and ophthalmoscopically there were seen signs of an old iritis. The patient consulted me for intense neuralgia which affected the brow, temple, eyelid, and left side of the nose. Pain and a thousand different other sensations, such as trickling of water, biting of insects, crawling of ants, pricking by pins, etc., were almost constantly present, and deprived her of sleep and rest. There were marks in these parts which looked like those of chicken-pox, but were, as I was assured, the remains of the herpes zoster. The sphere of the supra-orbital nerve was anæsthetic, as neither touch nor the prick of a pin, nor a moderately powerful constant current (4 milli-ampères) were perceived. It was therefore a case of Romberg's "anæsthesia dolorosa." In all other respects the patient was quite well. She had lost her catamenia three years ago without any trouble. There was no failure of physical or mental power, and she was, in spite of her sufferings, of a very cheerful disposition. Passes with the cathode relieved the pain, crawling, etc., at once, but the electricity had to

be used off and on for six months before the patient felt really comfortable. When I last saw her, in February, 1892, there was still a small patch of anæsthesia over the left brow.

Schirmer[213] mentions a somewhat similar case. A married woman, aged 55, who had been in excellent health before, was, at a time when almost the entire population of the place where she lived was down with influenza, suddenly taken with severe vomiting, headache, fever and bronchitis. The next day ophthalmoplegia of the right eye was noticed, and headache, heaviness in the head, and severe giddiness on attempting to sit up, continued for a considerable time. The fifth nerve was also involved, as shown by a degree of anæsthesia in the right side of the forehead, the conjunctiva and cornea, the eyelid, cheek, nose, and lips, and by paresis of the muscles of mastication. There was also paresis of the portio dura and the hypoglossus nerve.

The cases just related resemble very closely the affection which Uhthoff,[144] Pflüger,[145] and Guttmann[146] have recently described as acute superior and inferior *polio-encephalitis*, and the clinical symptoms of which are those of an acute nuclear ophthalmoplegia. They believe that in these cases the grey matter on the floor of the third and fourth ventricles is acutely inflamed, causing paralysis of the third, fourth, and sixth nerves.

It appears to me, however, much more probable that the seat of this affection is at the base of the brain, in the middle cranial fossa, and not central, and that it is, therefore, poly-neuritis rather than polio-encephalitis. It is quite possible that in my case (p. 182) the fourth cranial nerve may also have been originally affected, but as I first saw the patient eighteen months after the beginning of the illness, I am unable to speak with certainty about this point. When she came to consult me, the function of the fourth nerve was normal.

II. *The Spinal Nerves.*

1. *Intercostal Neuralgia* appears to have been a specially frequent sequence of grip. I have seen more cases of this form of neuralgia traceable to grippal infection in 1890-91 than in thirty previous years. The cases did not present any unusual clinical features, except, perhaps, that they yielded more readily to treatment than ordinary cases of intercostal neuralgia are in the habit of doing.

2. *Poly-neuritis of the other Spinal Nerves* after grip has been tolerably common. Remak[157] has seen the case of a gentleman, aged 50, who became gripped on Christmas Day with fever, bronchitis, and unusually severe pain in the back and limbs, which did not subside soon, as is usually the case, but became within the

following week complicated with paralysis of all four extremities. The paralysis was complete, and associated with the worst form of the reaction of degeneration in the sphere of both musculo-spiral nerves, with the only exception of the supinator longus muscle. A less severe degree of paralysis, and electrical wasting-test, with loss of knee-jerk, was seen in the two crural nerves, probably also the psoas muscle, and in the two ulnar and median nerves, while the muscles of the arms and the supinator longus were only paretic, and showed slight degenerative tests. The sciatic nerves had remained entirely unaffected. The cranial nerves were normal, and the pupils acted well. There was, however, a good deal of pain in the knee-joints, without any sign of articular rheumatism, such as swelling, or other trophic disturbances in the skin; and the nerve-trunks in both upper and lower extremities were extremely tender to pressure. It was therefore a case of multiple degenerative neuritis, or amyotrophic degenerative poly-neuritis, such as is seen in other infectious diseases, as erysipelas, angina, scarlatina, whooping-cough, etc.

Henoch[158] has described the case of a girl, aged 11, in whom a similar neuritis appeared as a sequel of grip. She had a feverish attack about Christmas, and had apparently quite recovered, when several weeks afterwards, having gone to bed in perfect health, she awoke one morning with complete paralysis of the left arm,

just as we see it in cases of acute polio-myelitis, or "infantile paralysis." That it was, however, a case of peripheral paralysis, and not owing to inflammation of the ganglionic cells of the anterior cornua of the cord, was shown by there being extensive anæsthesia and complete paralysis of *all* the muscles of the whole arm. In infantile paralysis only certain groups of muscles are affected, and sensibility remains unimpaired.

In some cases the poly-neuritis is of a much milder character, and does not lead to anæsthesia or paralysis, but to all kinds of paræsthesiæ and different forms of paresis. The following is a good example of this form of neuritis :—

Case XX. *Poly-Neuritis of the Spinal Nerves.*—A widow, aged 39, had influenza in March, 1890. She stayed in bed about a week, being extremely ill with fever and pain, and when she got up she felt "as if she had lost all the power she ever had." After the acute pain had subsided, she was particularly troubled by all kinds of odd sensations which she had in all four extremities, and which she described as "tingling, pricking, creeping, fluttering, pinching, tearing, throbbing, thrilling, and what not." She experienced great difficulty in standing, more especially when washing and dressing, and was then generally seized with such an amount of tremor that she was obliged to sit down to prevent herself from falling. When she first came to consult me,

and was standing on the doorstep of my house waiting to be admitted, she trembled so much that she had to hold on by the door-knob, or she would have fallen. Walking was also difficult, and she could not manage more than about two hundred yards at a time, and had to take hold of another person's arm, on which she leant heavily. The numbness and loss of power in the upper extremities were likewise considerable. The right hand was particularly weak; she could hardly take hold of the dynamometer, and only with the greatest effort brought the index of the instrument to 10° with either the right hand or the left. She had lost the power of carving a joint, of doing her hair, or of sewing, and had much difficulty in feeding herself. When attempting to sign her name, she could with the greatest trouble trace a single letter at a time, and in such a fashion that the character of her handwriting was completely altered. Every nerve then seemed "as if it were on the knock," and she felt almost silly when she had finished writing her name. She also complained of neuralgia in the head and frequent attacks of giddiness. She slept tolerably well, but felt exhausted and unrefreshed on awaking. Her memory was almost a blank, and the least thing was apt to excite or to flurry her so that she almost became speechless. She had lost her period, which up to the attack of grip had been quite regular.

On examination I found that all the superficial and

deep reflexes, with the only exception of the knee-jerk, were greatly diminished or lost. At the same time there was considerable tenderness on pressure in all the great nerve-trunks. Sensibility was much impaired, more especially in the forearms, hands, legs, and feet. The muscular nutrition had suffered considerably, both arms and legs having become much thinner, and the electric responses of the nerves and muscles were sluggish. Faradisation of the skin with a wire-brush was hardly perceived, even when great power was used. These signs, taken together with the extraordinary amount of paræsthesiæ and loss of force which were present, induced me to consider and treat the case as one of poly-neuritis. The patient was for some months under my care, and eventually recovered, chiefly by the aid of electricity.

Case XXI. *Rachialgia.*—Another case was that of a married woman, aged 37, whom I saw in November, 1890, and who had suffered from darting pain in the back, arms, and hands ever since she had influenza in February of the same year. She had been in good health before she was taken, but had been quite unable to do anything since being gripped, as the pain was much aggravated by movements and the slightest physical exertion. The whole of the vertebræ, but more especially the four cervical upper ones, were extremely tender on pressure, which caused shooting pains into the

arms down to the finger-tips. There were no other objective symptoms, and the general health was fairly good.

Sansom[141] narrates several cases of painful affections of the extremities which he ascribes to post-grippal neuritis.

A lady, aged 25, who had an attack attended with high fever four months previously, complained of intense aching in both arms. This occurred chiefly at night, and she actually cried on account of the pain. Previously to the manifestation in the arms she had suffered pain in the calves of the legs resembling that of neuritis. In another case of a gentleman, aged 41, the pain was referred to the lumbar regions more on the left side, to the right shoulder and the left wrist, to the course of the right sciatic nerve, and to the muscles of the thigh. There were fearful exacerbations, chiefly nocturnal, so that the patient, previously a healthy man, actually shrieked on account of the pain. In the case of a female, aged 33, pain was localised in the muscles of the calves of the leg and of the thigh. The pain was strongly aggravated after food, especially meat. In another female, aged 23, pain was extremely violent in the thighs and legs, and there were attacks of faintness. Subsequently the suffering was localised in the course of the right sciatic nerve. It was subject to remissions with severe nocturnal exacerbations; there were also

shooting pains at the epigastrium. The case was of alarming intensity, but recovered. In a lady, aged 48, pain was referred to the right hip and to the right arm; it extended from the right shoulder to the fingers, and all movement caused pain.

Neuritis seems sometimes to be complicated with, or preceded by, embolism. Eichhorst[128] has described the case of a man, aged 22, who had been in robust health before becoming gripped, and who complained, after the feverish attack, of severe pain in the left foot, with livid discoloration, and complete anæsthesia. Hot fomentations and constant friction caused these phenomena to disappear in three days. A week afterwards, however, paralysis of the right brachial plexus supervened, the muscles of the shoulder-blade and the whole arm being useless, with the exception of the abductor and extensor pollicis longus. There was no reaction of degeneration.

Church[159] has seen two cases of multiple degenerative neuritis, which appeared about a week after the attack was well over, in otherwise healthy middle-aged women, in whom no other cause of the disease could be discovered. There was pain, anæsthesia, paresis, loss of the knee-jerk and plantar reflex, atrophy of muscles and "reaction of degeneration." Both patients slowly recovered.

Westphalen[160] has described the case of a director of a

circus, aged 29, who had a slight attack of influenza, and felt on the seventh day general chilliness, pins and needles, and numbness in the fingers and toes. A week afterwards there was also debility in the arms and legs, vertigo, and difficulty of swallowing. Syphilis and alcoholism could be excluded. Although the loss of power, more especially in the right arm, was great, the faradic contractility of the nerves and muscles was normal. The biceps and triceps reflexes were lost, but there was no anæsthesia. The gait was uncertain and staggering; the knee-jerk was lost, there was no ankle-clonus, no anæsthesia; the bladder and rectum were normal. There was, however, slight paresis of the right portio dura, and some difficulty of deglutition. By the use of baths and electricity the patient recovered in four weeks, but the knee-jerk was still absent in both legs three months afterwards.

A sportsman, aged 25, of vigorous constitution, perceived a fortnight after having had influenza weakness in the legs. The gait was uncertain, tottering, but not atactic. He did not sway when walking or standing with his eyes closed. There was also loss of power in the arms, but sensibility was normal. There was tenderness on pressure in the nerves and muscles. The tendon reflexes were lost, the superficial reflexes normal. The mechanical excitability of the muscles was normal, the faradic excitability of the nerves and

muscles increased. Within the next few days the paralysis of the limbs increased, and eventually became complete. To this was added bilateral paralysis of the portio dura, with difficulty of swallowing and breathing. The patient's life was thus placed in extreme jeopardy when he took a turn for the better, and gradually recovered. It is possible that here we had to do with primary multiple infectious myositis, which secondarily led to neuritis.

Draper[161] has described a similar case of peripheral neuritis of the left *musculo-spiral* and *median* nerves, which led to paralysis and atrophy of the muscles supplied by them.

Homèn[162] has seen the case of a man, aged 29, who had never had syphilis, but was gripped in the commencement of 1890. During convalescence he complained of weakness and numbness in the right arm, and a week afterwards also in the right leg. Three weeks afterwards the muscles of the right shoulder and arm began to waste, and then the left hand, arm and leg. This went on progressively for from four to six weeks and then became stationary. The patient had some pain in the legs and feet. There was diminished sensibility and the gait was swaying, but the knee-jerk was present. He improved under treatment. A brother of this patient, aged 39, who had also had grip with pneumonia in January, 1890, had in September of the

same year fresh feverish symptoms, and numbness and paresis of the left arm, with reaction of degeneration. He likewise got better.

Havage[163] has described a case of acute *poly-neuritis* which occurred in a public-house keeper, aged 40, who had fever, general soreness all over the body, pain chiefly about the loins, and dyspeptic symptoms, with loss of appetite and insomnia. Soon afterwards paralysis appeared in the four extremities, the extensors of the spine, the muscles of the face and the external rectus of the left eye, together with pins and needles, and some degree of anæsthesia. The knee-jerk was much diminished in the left, and lost in the right leg. The bladder was not affected, but the urine contained a considerable quantity of albumen. The tongue, pharynx and diaphragm were not affected. The patient recovered, chiefly under the influence of hypodermic injections of strychnine.

Troublesome forms of neuralgia, apparently owing either to severe congestion of the peri-neurium or to neuritis, have also been seen in the breast, the coccyx, the hip joint, and other parts.

Herpes zoster has occurred together with neuritis in different areas of the cerebro-spinal system of nerves. Brakenridge[107] mentions a case where it appeared on the back of the left hand, in the sphere of the ulnar nerve. In the latter case it lasted three weeks. Twice afterwards the vesicles appeared to be shrinking and on the

point of disappearing, but filled again with clear serous liquid.

E.—Diseases of the Sympathetic System of Nerves.

I.—*Paralysis by Compression.*

Holz[73] has described an interesting case in which a patient, aged 31, who neglected himself during a second attack of grip, was suddenly seized with dysphagia and choking, from acute inflammation of the thyroid body. On the right side of the neck this organ enlarged to the size of a small apple, both eyes were protruded, and the case looked like an acute development of Graves's disease. On the third day ptosis of the right eyelid supervened, although the eyelid could be raised at will. The right pupil was constricted to the size of a pin's head, but contracted both to light and accommodation. This patient had for the last five years suffered from a high degree of hyperidrosis on the right side of the head, so that when he was eating, the perspiration ran on his plate and napkin; but now there was suddenly anidrosis on the right side, while vicarious hyperidrosis had become developed on the left side. The rate of pulsation was accelerated, and the arteries and veins of the fundus of the right eye were considerably narrowed. There were, therefore, such symptoms as we see after

experimental division of the cervical sympathetic nerve; and it seemed probable that the pressure of the inflamed swelling, or contiguous inflammation of the second and third cervical ganglia, might have supervened. The further progress of this case was favourable; for under the influence of iodine externally and internally, the swelling decreased considerably within a few weeks, and all the symptoms above described became less marked. As the patient had had hyperidrosis on one side for five years, it was quite clear that the sympathetic nerve had not been in good condition for some time; and grip in this case was, therefore, only the exciting, but not the determining cause of the affection.

2. Hemicrania (sick headache, megrim) is apt to become developed after the feverish attack is over, and it has sometimes become worse in those who had been habitually subject to it previous to the attack of grip.

Case XX. *Migraine.*—A married woman, aged 29, had been in good health until December, 1890, when she had a bad attack of influenza. The principal symptoms were fever, intense headache, and prostration. On the eighth day her head was particularly bad on awaking, and three hours afterwards she was taken with vomiting, which continued more or less throughout the day. In a fortnight she was able to leave her bed, but her head never felt quite easy, the pain being particularly liable to affect the left brow, and there being great soreness in the

vertex and the occiput. She is now liable to a regular attack of megrim about once a fortnight, an attack generally taking place the day she is taken unwell, and then again a fortnight afterwards. The pain in the left side of the head is so severe that she is obliged to lie down in a darkened room, unable to take anything but a little black coffee, and there is vomiting at intervals throughout the day. The next day she is able to get up, but has ever since been unable to attend to her household duties. I first saw her in June, 1891, when this condition had lasted without any perceptible change for five months, in spite of antifebrin, antipyrin, and exalgine, which she had taken. Her health was then altogether unsatisfactory. Besides the headache, she complained of pain in the limbs and between the shoulders, of giddiness, chiefly on stooping, of loss of appetite and constipation, and of profuse menorrhagia; and she considered herself to have become "a perfect wreck."

Various forms of *Headache* have likewise followed in the wake of influenza.

Case XXI. *Congestive Headache.*—A young lady, aged 21, had influenza in December, 1889. Her temperature went up to 105°, and she was in bed for a week. The principal thing she complained of when I first saw her in May, 1890, was sleeplessness and a most violent headache, which, as she averred, was enough to drive her mad. The pain was dagger-like, flying backwards and

forwards through her head. The temples were particularly affected, but no part of the head was free from pain. She had had all her hair cut off, as she could not bear the weight of it, and had had ice applied to the head without relief. The only thing which had done her any good was antipyrine, which eased the pain a little, and brought the temperature down, though it had never fallen to the normal level. She was in the habit of taking it three times a day, but it had lately lost its effect to a great extent. There was such photophobia that she could not bear any light, and was lying in bed with a black bandage on her eyes. She took nothing but milk, as she found that solid food, and more especially stimulants, increased the pain very much. The pulse was 108, the temperature 100·2°, the tongue much furred, and the bowels sluggish.

I prescribed twenty grains of iodide of potassium three times daily, and a drachm of amylen-hydrate at bedtime. This had the desired effect, as the patient, who had not slept at all for ten days in spite of the use of chloral and bromide, slept well for six hours consecutively, and felt much refreshed in the morning, with her head much easier. The photophobia disappeared in three days; on the fifth day she felt well enough to get up, and the day after had a drive in the Park. I last saw her on the tenth day, when with the exception of an occasional slight ache in the right temple, she ap-

peared to be quite well. The temperature was normal, and the pulse 80.

3. *Scintillating Scotoma.*

Case XXII.—In connection with this I may mention a case of scintillating scotoma, which I have not seen anywhere described as a sequel of grip. The patient was a girl, aged 17, whose family history was unimportant, and who had been in splendid health until she was gripped in February, 1890. She had had fever, headache, pain in the back and limbs, and more especially excruciating pain at the back of the eyes, which had continued after all the other symptoms had worn off. She had also become subject to peculiar sensations which she described as "silver and gold floating in the air," together with headache and temporary loss of sight, lasting for about twenty minutes at a time. After such an attack was over she felt prostrated, sick and giddy for the whole day. She had become very irritable and excited, was restless at night, and occasionally screamed without any particular cause, "except that she felt frightened." She was utterly incapacitated from attending to her usual occupations, and had become thin and anæmic.

4. *Graves's or Basedow's Disease, Exophthalmic Goître.* —Colley[165] has recorded the case of a woman who had an attack of influenza in the beginning of 1890. During the illness exophthalmus appeared, and towards the

end of February bilateral bronchocele was noticed. There was also tachycardia, the pulse ranging between 150 and 180. Graefe's symptom was wanting, but the converging movements of the eyes were defective. Her family had a neurotic history, the father being an excitable man, and the mother suffering much from palpitations; the patient had also suffered before from palpitations and tachycardia, but had had no other illness. Injections of ergotine into the nates led to considerable improvement. Villard[140] relates a case of Graves's disease which had existed eight years in a man, aged 36. The principal symptoms were tachycardia, and the mechanical annoyance caused by the hypertrophied thyroid body. He had influenza of medium intensity, with prostration. The pulse rose to 160, and was irregular; and paresis of the lower limbs, with tremor in the upper limbs, supervened. One morning after a restless night he found his legs paralysed; the palpitations were worse than ever; he had pain in the neck, and the right lobe of the thyroid body had considerably increased in volume. In the evening the palsy had disappeared, but returned next morning; it went off again after a few hours, but left greater debility than the day before; sensibility, and the action of the bladder and bowels, were normal. The tremor, however, became generalised, and exophthalmus was noticed.

5. The different plexuses of the *abdominal portion* of the sympathetic may also suffer during or after grip.

Sansom[141] has seen cases of visceral neuralgia, hepatalgia and gastralgia, in which there were signs of local tenderness pointing to a local cause, and in which he considered that the sympathetic fibres and ganglia were alone affected.

The following was a case of hepatalgia of paroxysmal recurrence:—"A gentleman, aged 43, who for many months previously had been in fair average health, was taken during the night with severe pain in the right hypochondrium. The signs simulated those of hepatic colic. He took a mild aperient, and the attack passed away after one or two hours and he slept. The following day the bowels were properly opened, there was no evidence of absence of bile from the motions, the urine was in all respects normal, and contained no bile nor excess of colouring matter. The attacks of severe pain, however, recurred at intervals—mostly in the night, but sometimes during the day—for about ten days, treatment by opium and belladonna only relieving them. It seemed that the gall-bladder could be mapped out by the area of tenderness, but never was there the slightest jaundice. On one night there was sharp diarrhœa. The attacks were those of hepatalgia of paroxysmal recurrence. In hunting about for a cause, the only antecedent which seemed at all probable in this direction

was an attack of influenza, contracted in Paris at the very earliest time of the epidemic, and followed by protracted enfeeblement. It was computed that nearly twenty months must have elapsed between the original attack and these consequences, if they were consequences. There was no evidence of reinfection, but of course this was possible."

A case of visceral neuritis during convalescence of grip has been seen by Ferguson.[165] Paroxysms of agonising pain in the abdomen were the chief symptoms; they were most frequent and severe in the morning, and nothing that was done gave relief. Death occurred after ten weeks of great suffering. The nerves and ganglia throughout the abdomen were found to be in a highly inflamed condition, and there was marked degeneration in some of the nerve tissues.

6. The *vesical plexus*, which springs from the inferior hypogastric plexus of the pelvic portion of the sympathetic, may possibly have been implicated in the following case :—

Case XXIV. *Irritability of the Bladder.*—A married woman, aged 32, consulted me in May, 1890, for a variety of nervous symptoms which had come on after a second attack of influenza. She had the first attack about Christmas, 1889, from which she recovered well, and was again in her usual health when she had a second attack in the middle of February, 1890. This was not

more severe than the first, and had shown the same signs, viz., fever, headache, prostration, and pain in the limbs. Ever since then, however, she had suffered from headache and mental depression, singing in the left ear, and sleeplessness, which latter she ascribed to extreme irritability of the bladder. This symptom came on quite suddenly, and obliged her to pass water almost incessantly, having imperative calls to do so at least every half-hour, by day as well as by night. There was no catarrh or any other disease, either in the bladder or the urethra which could cause this symptom, nor was there any displacement or other affection of the womb. The urine was feebly acid, had a density of 1004, and contained a slight excess of phosphates, but no albumen or sugar, or excess of mucus. The patient had been chiefly treated with belladonna, which had, however, remained ineffectual; and she eventually recovered under full doses of strychnine, which she took for six weeks.

F.—General Neuroses.

I. *Epilepsy.*

I have seen several cases in which epilepsy appeared as the direct consequence of the feverish attack of grip, but only in persons who had a neurotic predisposition. I have also seen relapses occurring in persons, through having been gripped, where there had been every reason

to believe that their old complaint had been conquered by treatment.

Case XXV. *Epilepsia Mitior.*—A boy, aged 11, with a highly intelligent expression, was brought to me in January, 1890. He had always been rather nervous, starting easily, and was so uncommonly sharp and shrewd, that he often astonished his parents by the clever and original way in which he talked. There had, however, been nothing really wrong with him until he had influenza about a fortnight ago. Since then he had been subject to attacks of alarm in which he suddenly called out, ran quickly to his mother, and was unconscious for about half a minute. There was no convulsion, but the boy seemed greatly upset after such attacks, which were very numerous and chiefly at night. The head was tender, the appetite poor, and he suffered from indigestion. I ordered him to be removed to the country, and prescribed dilute hydrocyanic acid with ammonium bromide. I am not able to speak of the further progress of the case, as I only saw the patient once.

Case XXVI. *Epilepsia Gravior.*—A girl, aged 19, whose parents were neurotic, had been in good health until she had an attack of influenza in May, 1890. She suffered from fever, intense headache, and prostration, and a fortnight after having been taken ill, had a convulsive attack in which she lost her consciousness and bit

her tongue. Since then she has had a succession of attacks, and on one day as many as twenty-nine. The convulsion generally lasted for three minutes, and affected principally the right side of the body. She bit the right side of her tongue, foamed at the mouth, and had petechiæ in the face after the attack. She slept habitually for half-an-hour after the attack, and then awoke dazed, asking what was the matter, what time it was, etc., complained of a splitting headache, and generally went to sleep again. Since the attacks commenced she had become stupid and indifferent to everything, and her memory was greatly impaired. I first saw her in July, 1890, and did not find any sign of organic brain disease. The principal functions of the body were normal, and there seemed to be no connection whatever between the attacks and the menstrual function, which was normal. The girl remained under my treatment for about six months, and made a good recovery.

Headly Neale[166] relates the case of a tall, healthy-looking girl, aged 25, who had had previously to being gripped no epileptic attack, but was of an excitable temperament, with somewhat prominent eyes, and slight ptosis of the right upper eyelid. In the spring of 1890 she had had a sharp attack of influenza, from which she soon recovered, and then first noticed the drooping of the right eyelid. There was no personal or family history of any neurosis. In May, 1891, she

had a second attack of grip, from which she made a rapid recovery. On the sixth day from its onset she had a well-marked epileptic seizure, falling suddenly to the ground, and sustaining a scalp wound, which extended the whole length of the parietal bone on the right side. The edges of the tongue were mashed to a pulp. She had two other attacks in the afternoon of the same day. Since then there has been no recurrence, and when last seen she was apparently in the enjoyment of perfect health, while the right ptosis had entirely disappeared.

Erlenmeyer[167] has seen what he calls a case of *Jacksonian Epilepsy* after influenza. A medical practitioner, aged 25, had no neurotic history, and no syphilitic or alcoholic antecedents, but had always been in excellent health until January 5th, 1890, when, after attending a number of gripped persons, he was taken with frontal headache, pain in the back and knees, lassitude, and profuse perspiration. Two days later he had vomiting and fever, but had to get up before he was well on account of his professional duties. He complained chiefly of insomnia, lassitude, pain, belching, and constipation, and was really quite unfit to be up. On February 1st he suddenly felt, while at dinner, numbness in the left hand and forearm, which was followed by slight twitches in the muscles, after which he fell from his chair unconscious. He came to after a few

minutes, and vomited. It was noticed that there were petechiæ on the face, neck, breast, tongue, and the conjunctivæ. He was in bed for five days, suffering from insomnia, headache, and belching. On the 7th he went out, but on the 8th, while walking, had a similar attack of unilateral convulsions, but without loss of consciousness. The twitches commenced in the left abductor indicis, then affected the extensors of the forearm for about a minute; there was a pause of two minutes, after which twitches began in the arm and shoulder, which lasted three minutes, and were followed by vomiting, which latter was repeated during the next few days. Nothing further happened afterwards.

Erlenmeyer argues that grip caused in this instance a localised disease of the cortex, which produced on one occasion monospasm with coma, and on the other only monospasm; and assumes that there was a small hæmorrhage in the cortical centre of the left arm, similar to the petechiæ which were observed in the face, etc.

Case XXVII. *Relapse of Old Epilepsy.*—A gentleman, aged 32, first came under my care in June, 1887, for an obstinate form of epilepsy, from which he had suffered since 14 years of age. It is needless to describe the previous history of the case, further than to say that the last attack took place in October, 1887, and that the patient, who had systematically followed treatment after that, believed himself to be quite cured of his old

complaint. He had got married and had two children, neither of whom had been troubled with convulsions during infancy. In February, 1890, he had a bad attack of grip, which confined him to his bed for about ten days, after which he felt so utterly prostrated that he was obliged to go to the country to recruit. About a fortnight after he had been out of bed he had a bad convulsive seizure in his sleep, which was presently followed by three others. Treatment by ammonium bromide and quinine was adopted, and he gradually got stronger, and had no more attacks. In November, 1890, however, he had a second, and in May, 1891, a third attack of influenza. After the second attack of grip he had, what he had never had before, two attacks of "petit mal," viz., complete loss of consciousness for a minute without convulsions. He also lost his voice, so that he was only able to whisper. There was no laryngitis or any other structural trouble in the larynx, but simply paralysis of the adductors of the vocal cords, such as is seen in hysterical women. Six weeks after the third attack of grip, he had an epileptic seizure with convulsions, tongue-biting, and discharge of urine, exactly in the same manner as had been habitual with him previous to his coming under my care. Since then there has been no further trouble.

Savage[113] has very shortly mentioned a case which looks somewhat like one of *epileptic automatism*, and has

a medico-legal interest. It was that of a coastguardsman, with a history of severe head injury twelve years before, but always of the most exemplary character and conduct, who, on returning to work soon after an attack of influenza, lost his memory of what occurred, although, as he subsequently ascertained, he had done his work properly, even during these periods of forgetfulness. He experienced a desire to kill one of his children, and resisting that, he wandered off aimlessly from the country town in which he lived to London, only remembering snatches, so to speak, of his peregrinations. Then he gave himself up on a charge of killing his child. I have seen a similar occurrence in a man who had previously been subject to other forms of epileptic automatism.

Van Deventer[105] reports cases in which epilepsy relapsed, after having been apparently cured, through the patient having been gripped; and that of a woman, aged 22, who had a first true epileptic seizure quite in the beginning of the feverish attack. Kraepelin[95] mentions a case where the attacks had disappeared for nine months, but where immediately after influenza a bad fit occurred. On the other hand, habitual epileptic attacks have occasionally been suspended for a time during the feverish attack and the period of convalescence, as is occasionally seen in the course of other febrile diseases, and have reappeared after the usual state of health had been regained.

2. *Infantile and other convulsions* may occur as complications in the feverish attack, without there being any coarse organic brain disease, such as meningitis, etc. I have already mentioned (p. 33) that influenza in children may begin with what looks like symptoms of meningitis, viz., intense headache, vomiting, constipation, grinding of teeth, and convulsions. Sévestre[168] has reported cases of this description; and Kinnicut[169] relates an extraordinary instance where there was a kind of convulsive epidemic amongst children of the same family. Three of them fell ill of influenza at the same time. One had eclampsia and broncho-pneumonia; the second had a slight form of grip and general convulsions, which continued off and on a whole week after convalescence had been established; and a third had bronchitis and convulsions, which recurred up to the time of death. Kohts[121] describes the case of a girl, three years of age, who had on the fourteenth day of a severe febrile attack unilateral convulsions, which subsequently also affected the other side of the body; and she was presently taken with left-sided hemiplegia, paralysis of the sixth nerve and the portio dura, nystagmus and aphasia. The autopsy showed hyperæmia of the dura and pia mater, and of the cerebral substance, more especially the central ganglia.

Revilliod[57] has seen *tetany* in three cases; and rigidity of the neck and trismus have been noticed by other observers.

3. *Tetanus.*

Churchouse[170] has met with a case of idiopathic tetanus following influenza. It occurred in a strong, healthy-looking girl, aged 16, who had been nursing a patient with influenza, and became herself mildly gripped for a week, without however being confined to the house. After this she found one day, when attempting to eat some rice pudding, that she could not open her mouth as well as usual, and was obliged to help open it with her fingers, and push the food off the spoon into it; this difficulty of taking food gradually got worse. The next day, when attempting to get up from her chair, she fell, and could not raise herself; she complained of stiffness in her back, and her father carried her to bed; she could get no sleep, nor take any solid food. The day after she continued to get gradually worse. There were now all the symptoms of tetanus, temperature 100°; trismus, risus sardonicus, and opisthotonos well marked; the nostrils distended, breathing quick, pulse rapid and feeble, bowels constipated: she was, however, able to take a little fluid nourishment through her teeth. Once or twice between that time and her death she had well-marked spasm of the glottis, and the least attempt at moving her brought on spasms of the voluntary muscles. On the fifth day the menses appeared, but were quite natural and at the proper time, and did not seem in any way to affect the disease,

which ran the usual course, and death occurred, apparently from exhaustion, seven days from the first appearance of the symptoms. There was nothing beyond the influenza to account for the attack. Careful inquiry was made for any trivial wound or injury, but there was not the least sign of anything of the sort.

Moretti[171] has reported a similar case, where the patient however recovered. A married woman, aged 45, who had not a trace of neurotic taint, and had had no wound through which tetanic infection might have taken place, was laid up with grip, when in a short time she felt pins and needles in the limbs, and presently had convulsions of true tetanic type. The cramps commenced in the muscles of the face and the back, trismus being well marked, and gradually spread to the upper and lower limbs. She was perfectly conscious the whole time. The convulsions gradually became more severe, and continued for about a week. The temperature, which had at first been very high, began to fall as soon as tetanus had declared itself. The convalescence was very slow. Moretti refers to a similar case seen by Monoguidi.[172] Two such cases have also been described by Alison.[173]

4. *Hystero-Epilepsy.*

Case XXVIII. A young woman, aged 20, had influenza in November, 1890. She appeared to have quite recovered from it, when on the fourteenth day she suddenly complained of a severe pain at the bottom of the back, fell

off the chair on which she was sitting, and went off into a violent attack of convulsions. She was not unconscious, but knew everything that was going on. The attack lasted nearly an hour, during which she rolled about on the floor, screaming as hard as she could, and attempting to bite those who approached her. She had six more fits on the same day, each lasting about twenty minutes; and after this she generally had fits at least two or three times a day. When I first saw her in February, 1891, she was in a constant state of tremor, more especially in her arms, which jerked about during the whole interview. There was great tenderness in the forehead and cervical spine, but not in the ovarian region. She complained of choking sensations, of having lost her memory, and said that her head felt either quite empty or like a lump of lead. There was an alternation of blushing and pallor in her face, she burst out crying several times, and appeared on the point of going off in fit, but became quieter when I spoke sharply to her. There was a degree of hemi-anæsthesia in the left side. It appeared that fits chiefly came on when the patient was pitied, or her condition talked over, or when she had been excited or upset, or contradicted, and latterly they had been followed by prolonged coma. On one occasion she had remained for sixteen hours in a comatose condition, and had been delirious for some time afterwards. She often "wandered" in her mind and seemed quite

absent. Her physical health was more or less broken down, and I ordered her speedy removal into the country, away from her friends, where she made a satisfactory recovery.

5. *Hysteria.*

That hysteria should be apt to follow grip seems very natural when we consider the influence of various toxic agents in the production of that disorder. While formerly unusual excitability of the nervous system and the occurrence of depressing mental emotions were believed to be the determining and exciting causes of hysteria, we now know that it is also apt to be produced by alcoholism, poisoning with lead and mercury, syphilis, typhoid and rheumatic fever, and morphinism. To these agents has now to be added the infectious influence of grippo-toxine, and numerous examples of it are recorded in medical literature, affecting males as well as females.

Case XXIX. A young woman, M. S., aged 21, single, consulted me in July, 1890, for feelings of faintness and giddiness which she had had ever after an attack of influenza in February of that year. Before then she had enjoyed excellent health, and had been assistant in a confectioner's shop, but had been obliged to give up her situation, and was now unable to do anything. She had completely lost her appetite, and suffered from obstinate constipation of the bowels. The menses had become

very scanty. She was in the habit of passing very large quantities of urine, which was of a pale straw colour, and contained hardly any solid constituents. She had on several occasions lost her voice for two or three days, being then only able to whisper. She suffered frequently from choking sensations in the throat, and complained of numbness in the left side. On examining the latter, I found hemi-anæsthesia, which was complete in the arm and incomplete in the leg, the nerves of special sense being unaffected. The field of vision was restricted, but the fundus of the eye was normal. There was ovarian tenderness.

A short time afterwards this patient brought her sister, E. S., aged 30, single, to me, who had had influenza two days after her, and suffered afterwards exactly in the same way as M. S. I have never seen a more perfect counterfeit of a type of disease than the case of E. S. was when compared with that of M. S.

Grasset[174] has described a case which occurred in a soldier, who was suddenly taken with influenza, and had an attack of loss of consciousness, which lasted for about twenty minutes. The temperature was 103°, and there was great prostration. An emetic was given, and soon afterwards the patient was taken with colicky pain, and severe pain in the wrists and ankles; the upper and lower limbs were seen to be in a state of contracture, there being extension in the lower, and flexion in the

upper limbs. In half-an-hour this disappeared, but the right side of the body now became anæsthetic; the patient burst out crying, the legs remained painful for two or three days, and the hand was paralysed. Electricity and magnetism were used, but had no beneficial influence.

Miropolsky[120] reports a case of hysteria in a young man, who had never on any previous occasion been subject to such or any other troubles. He was 25 years of age, a wheelwright by trade, and was while at his work suddenly taken with a shivering fit, which continued till the evening. Next morning he had the chief symptoms of the nervous form of influenza, viz., intense headache, pain in all the limbs, prostration, with nausea and vomiting. When he entered the hospital the fever was gone, but he suffered greatly from headache, pain all over, and had a difficulty in speaking. After a week's stay he appeared much improved, when one morning on getting up he was suddenly taken with an hysterical fit. He felt giddy but did not lose consciousness, screamed aloud, choked, had hiccough, and general hysteroid convulsions all over for half-an-hour. The tongue was not bitten. Next day it was found that he had left-sided complete hemi-anæsthesia, and total loss of the pharyngeal reflex, which persisted when he left the hospital ten days afterwards.

Voisin[185] has seen the following case:—A lady, aged 30, had chorea when 15, and afterwards hysterical attacks.

She was taken in 1890 with influenza. On the eighth day of the illness she vomited and lost the power over the left side of the body. She complained of intense headache, had a contracture of the right sterno-cleido-mastoid muscle, so that she could not turn her head to the side; the left arm and leg were insensible to pricking, and the muscular sense was nearly lost. She had left ovarian tenderness and hallucinations, thinking that animals were running about the left side. Soon afterwards she had a hysterical attack. The other symptoms continued for a fortnight, and then vanished.

Another case of Voisin's was that of a married lady, aged 48, who had always enjoyed excellent health, and whose family had no neurotic history. She had influenza, which was chiefly localised in the respiratory and digestive organs. In a week these symptoms had disappeared, but she had become extremely nervous. She complained of spasm in the œsophagus, choking sensations, and loss of sensation in the left hand, which had also to a great extent lost its muscular power. She had tender points in both ovarian regions, in the left breast and on the vertex, with patches of anæsthesia in the face and left leg. The field of vision was restricted, and the hearing on the left ear diminished.

Rambaud[176] has seen a boy in whom attacks of delirium took place, during which he shouted "Murder! thieves!" and on other occasions had somnambulism, to

which he had, however, been subject on previous occasions.

In a case of Guibert's[177] a woman, aged 35, had had numerous nervous troubles since childhood. At seven years of age she fell into the water, and had double pneumonia with paralysis of all the limbs, and aphonia, persisting for some months, of which she recovered, but had several relapses. Later on she had hysterical attacks, and after marriage contracted syphilis from her husband. She then suffered for some years from attacks of vomiting, but eventually got well, and had for some years had nothing to complain of, when she was taken with influenza, which commenced with a violent convulsive attack, the temperature being 103°, and there being much vomiting, and pain in the joints. In about a fortnight she was convalescent, and then noticed that her fingers were painful and apt to get white or blue, and she had a difficulty in moving them. When they got white she had a feeling of constriction in them, and when blue, a kind of swelling. The pallor appeared chiefly when she put her fingers into water or used them, or when she was excited. In the evening the face generally became red on one side and white on the other. There was pharyngeal insensibility, restricted field of vision, and specific choroido-retinitis. In May of the same year, however, the nervous symptoms had all disappeared.

Le Joubioux[178] relates the case of a woman, aged 27, who had rheumatic fever when 13, and showed nervous symptoms and hysterical attacks some months afterwards. Three years ago she had typhoid fever, during which she was long delirious, and afterwards had melancholia, paralysis of the bladder, and hysterical attacks. She had, however, been quite well for about three years when she was taken with influenza in December, 1889. She was in bed for a fortnight, and during convalescence had an attack of melancholia, during which she ran away, and did not stop until she came to the edge of a sheet of water. She did not know where she was or why she had gone there, nor which way she had come. The next day she believed that she was getting mad like her brother, who suffered from epilepsy and idiocy, and attempted to shoot herself with a revolver. She was, however, not hurt; after the shot she burst out crying, and said she would not do it again. She was hypnotised by Voisin, and while in this condition related all the incidents of her running away.

Another case of Le Joubioux's is that of a boy, aged 12, who had suffered from frontal and occipital headache. He had influenza in the beginning of January, 1890, and was three days in bed. The fourth day, feeling better, he was on the point of going out, when he suddenly felt giddy and fell down speechless, remaining on the ground for three or four minutes.

Similar attacks occurred during the next few days, and he was then taken to La Salpétriere, where a tender point was found under the left breast. Pressure on it caused a feeling of anxiety and oppression, as if he were going to have an attack.

The following was a case of hysterical dumbness:— A man, aged 46, rather gouty but otherwise in good health, had influenza in January, 1890, which lasted eight days. When convalescent, he complained of loss of appetite, a furred tongue, heaviness in the epigastrium, headache, and odd sensations in the head. On examination the stomach was found to be dilated, and the urine scanty, and depositing a sediment. Soon afterwards he became desponding, said he would never get well, could not fix his attention on anything, and slept badly. He burst out crying on the slightest occasion. In June he suddenly, while conversing, lost his voice and speech, and could not utter a sound. Such an attack now came on every day, lasting for three or four minutes. He was then obliged to write in order to make himself understood. Although these symptoms appeared about six months after the attack of influenza, it must not on that account be supposed that they were not owing to it; for ill health had set in immediately after the attack, and there had been a long series of symptoms eventually culminating in the attacks of sudden dumbness.

Similar cases have been recorded by Bidon,[37] Duhomme,[179] Mouisset and Huchard,[180] Séglas,[181] Railton,[182] and others.

6. *Astasia-Abasia.*

This peculiar morbid condition, which constitutes a rare form of hysteria, is characterised by the impossibility of standing and walking, while there are no other morbid symptoms in the legs. Sensibility and muscular power are good, the tendon reflexes normal, and co-ordination easily effected while the patient is in the sitting or lying position, and the patient can also move about by hopping and creeping. Helfer[183] and Möbius[184] have seen cases of this kind coming on after grip. One of them was that of a girl, aged 10, who was brought into the hospital on her mother's back, having been unable to keep the erect position ever since an attack of influenza. There was tenderness of the upper dorsal vertebræ, but the motor power, sensibility, and the reflexes were normal; yet when the girl was placed on her feet unsupported she collapsed at once. She was told that she was sure to recover, and from that time improved, until in about a month she was perfectly well.

7. *Catalepsy.*

Inglott[185] has seen several cases in which catalepsy appeared immediately after an attack of influenza had subsided. One of them was that of a woman, aged 32, mother of three healthy children, of poor condition, who

had a severe attack of influenza on January 5th. Her symptoms were shivering, abdominal pains, want of appetite, obstinate constipation, vague pains all over the body, and great restlessness; temperature 103°. After four days illness she was well enough to get out of bed. She was seized, however, with a sudden loss of consciousness. On being called to see her, he found her lying in bed apparently senseless, with her eyes open. The pulse was 120 and weak; the colour of the face very pale. On raising first one arm and then the other, they remained in the position in which they were placed. He then attempted to rouse her from the senseless state, and for nearly five minutes she remained sitting on the bed in the same position in which he had placed her. He raised her legs from the bed, and they remained so for nearly ten minutes.

The fit lasted for nearly two hours, and the disease subsided with the first attack, the woman having been all right ever since.

8. *Trance.*

A case of this kind has been described by Raw.[186] It was that of a married woman, aged 39, who had been hysterical, and had had a severe attack of grip, with excruciating pains in the head, and great prostration of mental and bodily power for two weeks. After spending an anxious day she fell into a deep sleep, during which she had a dream, and was awakened by a loud voice

saying, "You are dead." She felt quite helpless, and lay in this state for two days, refusing all food. When visited by the doctor, she informed him that she was dead, and wished to be buried. The doctor then caused her to be admitted into the Borough Asylum, where she arrived quite helpless. She could not sit on a chair unless held in position, without which she fell to the ground. The limbs were relaxed; she was unconscious and could not be roused; the heart's sounds were almost imperceptible, and the pulse could only be felt as a minute thread at the wrist, and was 45. The respiration was shallow and hardly discernible. She was placed in a warm bath and vigorously rubbed; opened her eyes and looked leisurely round, but at once relapsed into unconsciousness. She remained in this condition for seven more days, and could not be roused either by cold water or electricity. The conjunctival reflex was present, the knee-jerk much exaggerated, the urine and fæces were passed into bed, and she was fed artificially, as she had refused food absolutely all the time. Four days afterwards she suddenly opened her eyes, having been unconscious for ten days, took a cup of tea, and answered questions in a whisper. The next day she was cheerful, talked rationally, but did not know where she was, and had no memory of the events of the last ten days; she took

her food well, and sat up in bed. From that time she made an uninterrupted recovery.

The diagnosis in this case rested, as Raw has pointed out, between (1) delusional insanity, (2) hysteria, (3) catalepsy, and (4) trance. As there was no muscular rigidity, it was not a case of catalepsy; nor are the symptoms purely hysterical, seeing that it had been impossible to rouse her. Pure insanity was negatived by the fact of the absolute loss of memory during that period and the sudden and complete recovery. There remains, therefore, trance, owing to arrested action of the nerve-cells, which latter was no doubt due to exhaustion, through the depressing action of grippo-toxine.

A case of prolonged somnolence after influenza has also been described by Barrett.[187]

9. *Chorea.*

Case XXX. *Chorea in Alternate Sides.*—A girl, aged 15, who had been in good health before, had two separate attacks of influenza in February and March, 1890. The first attack was comparatively mild, the fever having only lasted a day, and she soon got up again, and in a few days felt as well as she had done before. The second attack was much more severe; the fever lasted four days, and there was endocarditis and bronchitis, with spasmodic cough and profuse expectoration. At the same time the parents noticed great unsteadiness in her left side, more especially in the arm and hand, which

sometimes actually "danced about," and became quite useless, for whenever she took hold of a thing, she dropped it almost at once. She could not do her hair, cut her meat, or do anything in which the left hand was concerned. The left leg also jerked about almost incessantly; she had difficulty in walking, and while she was able to support herself when standing on the right foot, she could not stand for an instant on the left. There was an aortic murmur, and enlargement of the left ventricle. The knee-jerk was exaggerated on the left side, and normal on the right; the tap on the left patellar tendon appeared to be intensely painful, and sent a thrill through the whole body. She suffered from headache, and there was tenderness on cranial percussion. I prescribed antipyrin, quinine and arsenic, under the influence of which the patient improved considerably. Two months afterwards, however, she was brought to me again with the report that the chorea had now migrated to the right side, the left having been well for some weeks past. At the same time, the period, which had before been regular, had ceased, and she had suffered from profuse epistaxis at certain times. She often saw a mist before her eyes, and lost sight completely for a few minutes. The ophthalmoscope, however, showed nothing abnormal. The symptoms of chorea on the right side were now more severe than those on the left had been. The right leg was so

unsteady and powerless that she staggered along rather than walked, and had several times fallen down. The right hand was so weak that she had quite lost the power of writing, and her speech was so bad that it was very difficult to understand the little she did say; and she appeared quite unable to finish a sentence. The dynamometer showed 20° in the right, and 80° in the left hand. She slept, however, fairly well, and the appetite was good. The heart's action was very unsatisfactory, the aortic murmur being louder than before, and the pulse 128 and irregular. The girl suffered occasionally from attacks of dyspnœa and palpitations. I now put her on digitalis and phosphorus, and she then began to mend. When I last saw her in May, 1891, there was no trace of the chorea left, and her health was good. The aortic murmur persisted, but the heart gave her no trouble. The pulse was 72, of medium tension, and she had had no oppression on the chest or palpitations for some months past.

Case XXXI.—In February, 1891, a girl, aged 9, was brought to me, who had had scarlet fever at seven years of age, and had never been quite well since. She appeared nervous, started easily, and her appetite was at times ravenous, while at other times she would eat nothing. She had, however, much improved during a stay at the seaside in September, 1890. The attack of influenza was severe, the patient complaining chiefly of

intense headache and backache, and pain in the eyes. On the sixth day when she was convalescent, it was noticed that she dropped a tea-cup and other things which she held in her hand, and the symptoms of right-sided hemi-chorea were well established when I saw her about ten days afterwards. The speech was affected, the right arm was constantly jerked about in all directions, and the right leg was very unsteady. There was considerable loss of power in the right hand. There had been no rheumatism, and there was no heart disease. She made a fair recovery.

Villard[140] has seen a case of chorea coming on on the ninth day of influenza, in a girl aged 9. There was general agitation, and such unrest that there was great difficulty in feeding her. In other cases chorea appears to have disappeared during the feverish attack of grip, and reappeared after convalescence had been well established.

10. *Agoraphobia.*

Case XXXII.—A merchant, aged 51, married, had had much trouble in business when he was taken by influenza in April, 1891. His health had not been very good before, as he had felt nervous, and had suffered from insomnia for some time. The family history was bad, as his mother had been demented the last ten years of her life, and his sister suffered from a troublesome form of Graves's disease. After the influenza was over, he was

surprised to find, on going out, that he could not walk properly as soon as he came into the street. He had no difficulty in going up and downstairs, and walking about in his rooms, but when he attempted to leave the house, he was seized by a terrible sensation of anxiety; his head and whole body felt as hot as fire, and he swayed about like a drunken man. He found, however, that when he was supported by taking the arm of his son, he could walk out of doors pretty nearly as well as indoors, although even then he soon got tired and had to get into a cab. His memory and mental capacity in general were quite as good as before, and there was no sign of organic disease. Under the influence of a tonic treatment, and change of air and scene, the patient gradually improved, and was fairly well when I saw him last, in November, 1891.

F.—Diseases of the Eyes.

Some few observers, such as Panas, Warlomont and Wicherkiewicz,[188] have denied that influenza is particularly apt to be complicated and followed by eye-diseases, and have maintained that there is no special ocular affection which is characteristic of grip. It is, however, impossible to side with this opinion when we find, on the other hand, a very large number of competent and even eminent ophthalmic surgeons who have reported

hundreds of such cases, which they have one and all attributed to an accompanying or preceding attack of influenza.

Galezowski[69] more particularly states that affections of the eyes are much more frequent in influenza than is commonly imagined, and enjoins the importance of not confounding them with analogous and less grave affections from other causes.

An analysis of the cases of eye-disease which have been seen in connection with grip, shows that in some of them there had been morbid antecedents on the part of the eyes, so that these organs might be supposed to have lost their normal power of resistance; while in the vast majority of instances it is reported that the eyes had been perfectly healthy previous to the attack of grip, and that it was difficult to explain why that virus should have localised itself so frequently in the various structures of the eyes. As, however, the nutrition of the various structures of the eye is dependent upon a normal condition and function of the fifth pair of cranial nerves, and as we have seen (p. 61) that the nuclei of the fifth pair in the bulb are particularly liable to be poisoned by grippo-toxine, the extraordinary prevalence of inflammatory eye-affections during an epidemic of influenza appears to me readily accounted for. Guttmann[146] and Galezowski[69] have expressed themselves very much in the same sense

It would be easy to fill a good-sized volume with a report of the observations which have been published on the eye-affections which are apt to follow an attack of grip. Considerations of space, however, compel me to be brief, and I will, therefore, refer those who wish for more detailed information on this subject to the writings of Galezowski,[69] Landolt,[189] Macnamara,[50] Gillet de Grandmont,[62] Fuchs,[190] Sedan,[191] Vanden Bergh,[192] Klebs,[7] Gradenigo,[193] Adler,[194] Coppez,[195] Hosch,[196] Eversbusch,[197] Rampoldi,[198] Hirschberger,[199] Decker,[200] Pokitonoff,[201] Remak,[202] Landsberg,[203] Laqueur,[204] Rosenzweig,[205] Alt,[206] Bock,[207] Bergmeister,[208] Delacroix,[209] Fukula,[210] Frank,[211] Guttmann,[146] Greef,[212] Schirmer,[213] Hillemanns,[214] Königstein,[215] Lindner,[216] Makroki,[217] Nimier,[218] Schapringer,[219] Sattler,[220] Stöwer,[221] Socor,[222] Uhthoff,[144] Bezly Thorne,[223] Whipham,[224] Callan,[225] Weeks,[226] Higgens,[227] Vignes,[228] Gazis,[229] Brieger,[230] Comby,[231] Pflüger,[232] Natanson,[233] Lee,[234] and many others.

1. *Inflammation of the eyelids*, leading to œdema and abscess, has been very frequently seen with and subsequently to influenza ; sometimes, indeed, several weeks after the patient had been apparently well. This seems to have been particularly common at Paris, where Landolt[189] drew attention to it quite in the beginning of the epidemic of 1889-90. The œdema appeared suddenly in the night, so that on awakening the whole eye

was covered by it, as is seen in the "black eye" from injury. The œdema was soft and the skin pink; there was no erysipelas. The affection was benign, and yielded quickly to simple treatment.

Abscesses were also tolerably frequent, especially during convalescence. The fever, which had subsided, returned, there was throbbing pain in the eyelid, intense headache, and insomnia. The upper eyelid then began to swell, and often so considerably that it encroached upon the brow and temple. The skin was dark red, and fluctuation appeared very soon. With a deep incision and subsequent drainage, the affection generally healed in about a fortnight without involving the eye itself.

Madame Pokitonoff[201] describes the case of a man, aged 20, who came into the hospital with an abscess on the left upper eyelid, which had come on shortly after influenza, and was of the size of a pigeon's egg; the skin was red and swollen. It was intended to open it, but a lotion of biniodide of mercury was first used, under the influence of which the abscess rapidly got smaller, and eventually disappeared without operation. A month afterwards the same patient presented himself again with an abscess on the other eyelid, but much larger, and which had to be opened.

2. *Dacryocystitis* has also been often observed, and always been unilateral and benign. There have been likewise cases of inflammation of the cellular tissue of

the orbit, orbital periostitis, and inflammation of the capsule of Tenon. Fuchs[190] has recorded four cases of the latter affection. One of these patients was a working man, aged 46, who on the fourth day of the attack of grip noticed a swelling of the right eyelid, which presently increased so much that the eye was entirely closed for a week. He could only open it again after a quantity of matter had been discharged. Panophthalmitis, with complete blindness, supervened, and pus was discharged from an ulcer below the cornea. The probe entered into Tenon's space. A pure cultivation of Fraenkel-Weichselbaum's pneumococcus was obtained from the pus, and when inoculated in mice caused death from septicæmia in a few days. Schapringer[219] reports a similar case.

3. By far the most frequent affection of the eye with and after grip, however, has been *conjunctivitis*. Indeed, Leube[230a] considers that influenza may be diagnosed from the state of the eyes, which he found quite peculiar to grip. They appear moist and shining, the conjunctiva is injected and painful, and the patient complains of pain at the back of the eyes, which is rendered worse by movements of the eyes. Bezly Thorne[223] and Gradenigo[193] consider the conjunctiva to be the entrance-gate for the microbe of grip, and assert that inflammation of that membrane is nearly constant in the febrile attack, while it very frequently appears later on as

a sequel. Bezly Thorne believes that antiseptic washings of the conjunctiva at an early stage render the course of the whole malady very much milder, although he no longer considers that such washings are valuable as a prophylactic, for he has himself twice developed the malady while assiduously persevering in their use. Wicherkiewicz,[188] on the other hand, combats the idea that the conjunctiva is first invaded by the microbe of grip, thinking that it would not find a suitable soil there, because it would at once cause the sensation of a foreign body in the eye, and would thus be readily removed by manipulation or washing.

It has been noticed as peculiar by several other observers that there was very little secretion in the conjunctivitis of grip, much less than is habitually seen in ordinary catarrhal conjunctivitis, while both redness and pain were intense. The inflammation often begins on the very first day of the illness, with pain in one or both eyes (ophthalmodynia); the eyelids are heavy, drooping, and very tender throughout the day; in the evening they are more firmly closed, and in the morning glued together, in spite of there being so little secretion. There is likewise photophobia, lachrymation, and absolute impossibility to read or write, or even to fix an object. The peculiar nervous symptoms which are connected with this grippal conjunctivitis render it probable that it is not an ordinary inflammation, but is owing to

neuritis of those fibres of the fifth nerve which supply the membrane; for with it there is generally violent neuralgic headache, extending far back into the head, and vomiting; another symptom being somnolence between the attacks, which lasts for several days.

The neuralgia which accompanies the conjunctivitis so frequently sometimes extends to all the branches of the fifth nerve. It may affect the ear, spread to the temple, and eventually invade the scalp and the teeth. There is also some periodicity in the attacks of pain, which are generally aggravated at night. Whipham[224] found that almost all his patients who had such attacks complained of a burning sensation in the eye and a heavy pressure, and that hyperæsthesia persisted long after the other symptoms of grip had disappeared. It has also been noticed that for the cure of this form of conjunctivitis it was not sufficient to trust to simple antiseptic lotions, but that it was necessary to combat the general affection as well. Galezowski[69] gave his patients from seven to ten grains of hydrobromate of quinine per diem, for about a fortnight, with great advantage.

Eversbusch[197] states that grippal conjunctivitis appeared and subsided more suddenly than ordinary conjunctivitis. Landolt[189] describes a peculiar form of the affection which occurs chiefly during convalescence, affecting both the eyelid and eye, and showing a deeper and more violet colouration, thus indicating a partici-

pation of the superficial layers of the sclerotic. The follicles were seen to be swollen, giving rise to the velvety aspect of follicular conjunctivitis. This was accompanied by severe photophobia, lachrymation, and sometimes by muco-purulent discharge. Occasionally there was true episcleritis, with deep injection of the sclerotic, severe pain, and neuralgic shoots towards the brow, forehead and temples.

4. *Keratitis* is another inflammatory eye-affection which is apt to occur during the feverish attack, but more particularly during convalescence from it. Eversbusch[197] states that he has seen it in two forms which are otherwise rare, viz., 1st, the keratitis punctata superficialis; and 2nd, more frequently, the keratitis dendritica exulcerans, which he would prefer calling herpes corneæ cachecticus, as it also occurs in struma, tuberculosis, and whenever the general nutrition of the body is impaired.

Pain, lachrymation, and photophobia were chiefly seen in those cases in which the lesion was superficial, with detachment of the epithelium, as it is the superficial layers of the cornea which contain the largest number of nerve-fibres. In general these cases got well soon, and only slight opacities remained behind. Where the inflammation was, however, more deeply seated, the cornea was anæsthetic in the beginning, and pain, lachrymation and photophobia were either slight or altogether wanting.

On account of this indolence of the affection, the patients applied for advice only after the ulceration had made considerable progress. It was slow to heal, and left large opacities.

The description given by Galezowski[69] of grippal keratitis is somewhat different. He states that it begins with lachrymation and such a degree of photophobia as to prevent the patient from opening either the diseased or the healthy eye, there being complete blepharospasmus. One side of the face, the teeth and the scalp are excessively tender and painful, and the neuralgia becomes much worse towards evening. There is also fever, nausea, vomiting, constipation, and complete anorexia. The photophobia lasts three or four days, and is then replaced by the opposite condition, viz., complete anæsthesia. The lachrymation continues, and is accompanied by intense redness of the whole eyeball. The cornea loses its clearness and becomes dull and cloudy. This is particularly marked in certain places, and when these are examined by lateral illumination, it is seen that there is superficial ulceration in the form of a triangular zone, extending from the periphery to the centre of the cornea. This zone is completely anæsthetic, so that the patient will allow the ulcer to be touched with a probe in its whole extent, without feeling the slightest pain or uneasiness. The other parts of the cornea are on the contrary highly hyperæsthetic.

Galezowski believes this anæsthetic ulcer of the cornea to constitute a pathognomonic sign of influenza, calling it the *triangular keratitis of grip*. He considers the affection to be owing to peri-neuritis of those fibres of the fifth nerve which proceed to the cornea, and which are indispensable for the nutrition and the very existence of that membrane, the cornea being liable to ulceration and necrosis unless these nerves are in a state of physiological efficiency. These nerves are trophic nerves, for as the cornea has no vessels, it can have no vaso-motor nerves. He states that grippal keratitis resisted the treatment which is found effective in other forms of keratitis. It was necessary to employ carbolised spray, nitrate of silver in solution, and to paint the cornea five or six times a day with a one per cent. solution of pyoctanine, to which the internal use of hydrobromate of quinine had to be added. Where the anæsthesia of the cornea persisted after the ulcer was healed, an ointment containing strychnine, and the application of the constant current of electricity, were required.

Similar observations have been made by a large number of other writers. Thus Bock[207] has seen cases of what he describes as herpes corneæ, or keratitis vesiculosa, in grip. There were groups of small vesicles on the cornea, with clear contents, the patient complaining at the time of shivering fits and frontal headache. One of these patients had, a few days afterwards, renewed

shiverings, and developed intercostal herpes zoster. Bayer describes a form of dendritric keratitis which occurred in the shape of multiple focal lesions, chiefly in the upper half of the cornea. In most cases it resulted in ulceration, which was occasionally deep, but without leading to perforation. In a few weeks the disease disappeared, leaving a scar which was not very apparent. Delacroix[209] and Rampoldi[198] have also seen numerous cases of what they call "serpiginous" keratitis in the wake of grip.

4. Cases of *iritis* and of *irido-chorioditis* have not been uncommon. In a case described by Hosch,[196] a child, aged 13 months, had first iritis, and then purulent hyalitis, such as is seen in cerebro-spinal meningitis. Suppuration supervened spontaneously, without being preceded by an aggravation of the general condition.

Pflüger[145] has seen a young woman who had purulent uveitis and panophthalmia as a manifestation of grip, and removal of the eye became necessary. He also saw a case of severe bilateral iritis in an aged man, coming on immediately after a bad attack of influenza; and a case of hæmorrhage into the vitreous body in a woman aged 66. Laqueur[204] has seen a case of bilateral embolic irido-cyclitis in a woman, aged 43, who had been perfectly well until she had an attack of the gastric form of grip. On the seventh day of the illness she suddenly

became completely blind through the process just mentioned.

Acute glaucoma was noticed by Rampoldi[198] in seven patients during convalescence from influenza. One of these was a woman, aged 44, who had for a number of years past had a small adherent leucoma, which gave her no further trouble. After the influenza she was taken with acute glaucoma in the same side, and lost her sight rapidly. Gradenigo[193] also mentions two cases of acute glaucoma supervening, one in a patient with leucoma, another in one who had been quite well before. Similar cases are recorded by Eversbuch[197] and Badal.

5. The *optic nerve* has been found to suffer after grip from hyperæmia, different forms of inflammation, and atrophy, and there have been also cases of embolism of the central artery of the retina.

Pflüger[145] describes a case of hyperæsthesia of the retina from hyperæmia of the optic nerve. A woman, aged 53, had influenza, of which she had not quite recovered when she began to complain of photophobia, photopsia, and weak sight for near and far objects. The discs appeared decidedly hyperæmic, the inner upper margins being veiled. She was put into a dark room, and given iodide of potassium, under the influence of which she considerably improved. Hillemanns[214] mentions the case of a girl, aged 15, who had been in excellent health previous to a bad attack of influenza, at the

end of December, 1889, with fever, severe headache, pain in the back and limbs, and prostration. During the first week of January these symptoms became gradually less; but on the 8th of that month the sight of the right eye was found to be impaired, and got worse during the next few days. V = $\frac{20}{40}$. The ophthalmoscope showed a typical *acute optic neuritis.* The tissue of the papilla was turbid and swollen, the veins dilated and tortuous, and parts of the vessels and the edges of the disc indistinct. The patient was treated with mercurial inunction and other measures, but appeared some time afterwards a good deal worse.

Denti mentions the case of a warder, aged 37, who had been in good health before he fell ill with influenza, and found on the third day that he saw badly with the right eye, and presently lost the use of it altogether. When examined, a central scotoma was discovered, while the periphery of the field and the sense of colour were normal. Ten days afterwards the disc was seen velvety and swollen in its central portion, the central veins being more turgid than those of the healthy eye. He diagnosed retro-bulbar neuritis, with tendency to spread to the papilla. Papillitis was still more marked at a later examination.

Gazis[229] has also observed a case of papillitis in a needle-woman, aged 18, who had been in good health, but had always had defective sight, chiefly with the right eye.

In January, 1890, she had influenza. Ten days afterwards she noticed that the sight of the right eye became so bad, that she could not walk about well if she closed the left. She also had pain in the orbit. A degree of papillitis was discovered with the ophthalmoscope, and eventually atrophy and discolouration of the papilla were found.

Bergmeister[208] mentions the case of a man, aged 38, who had been in good health, and never complained of his eye-sight, when he caught influenza, but during convalescence from it suddenly noticed that his sight became impaired. He could hardly count the fingers with the right eye, while with the left he counted them at one to two inches distance. Examination of the fundus showed atrophy of the optic nerve, the disc being white and opaque, the lamina cribrosa veiled, the vessels narrowed, and their walls thickened. Bergmeister thinks that the affection began as retro-bulbar peri-neuritis.

Vignes[228] has described a similar case which occurred in a healthy woman, aged 27, who had had excellent sight until taken by grip. On the eighth day of the illness she noticed impaired sight, and the next day found herself totally blind on the left eye. V=0. The ophthalmoscopic appearances were nearly the same as in the previous case. The sight improved to some extent, being eventually $\frac{4}{10}$; yet the disc appeared white and

wasted, and the field of vision was restricted in all directions.

B. Remak[202] has seen the case of a farmer who, in the course of the feverish attack, was taken with epileptiform convulsions and severe headache, followed by atrophy of the optic nerves, with central scotoma; and Weeks[226] gives the case of a man, aged 24, who had, in addition to the usual symptoms of grip, most severe frontal headache, which was followed by failure of sight. When he came under care, vision was $\frac{20}{200}$ in the right, and $\frac{10}{200}$ in the left eye. The discs were pale. There was no history of syphilis, alcoholism, or excess in smoking.

Whether atrophy as a primary process is apt to follow influenza, is doubtful, more especially because cases of this kind have often only come under proper notice some weeks or months after the beginning of the affection. At any rate it seems certain that atrophy of the optic nerve follows inflammation in an unusually short time in post-grippal cases.

Stöwer[221] has described the case of a workman, aged 35, who had grip about Christmas, 1889, and was in bed for nine days. Shortly after he had got up his sight became impaired, and when examined, vision was found to be in both eyes $\frac{1}{30}$. There was dyschromatopsia, green was not recognised, but described as grey or yellow, while red was described as yellow. The disc was found to be white and excavated. The patient

improved somewhat under the influence of hypodermic injections of strychnia, vision eventually being $\frac{1}{10}$. No further progress, however, was made, and the dyschromatopsia remained as it was in the beginning.

The same observer mentions the case of a boy, aged 12, who had been at school and in thoroughly good health until he became gripped. After the fever, headache, and vomiting had subsided, he found himself unable to read. Both pupils were dilated, and responded very little to accommodation, and not at all to light. On the right eye there was complete amaurosis, while with the left the boy could see movements of the hand across the eye. The discs were exquisitely white, circular, and excavated, but the vessels were not smaller than usual. Treatment led to a slight improvement, but the general aspect of the case remained unchanged. Both nerves being affected in a very similar manner, rendered it probable that the lesion was either in the chiasma or in the nuclei, and constituted primary atrophy proceeding from either of these points. Possibly there may have been pressure on the chiasma, from suddenly developed dropsy of the third ventricle; for Türck has shown that pressure of the liquid contained in a distended third ventricle may cause optic atrophy.

Embolism of the central artery of the retina after grip has been seen by Hillemann.[214] The patient was a youth, aged 19, who had influenza on January 5th,

which confined him to his bed for three days. The chief symptoms were coryza, cough, and pain in the back and legs. He felt considerable prostration until the 14th, when he returned to work. On the 17th, while ploughing a field, he suddenly became blind on the right eye. The ophthalmoscopic examination of the affected eye showed that there was embolism of the central artery of the retina, without participation of the macular branch of the vessel, which was unaffected. After a time the arteries contracted and became filiform, and finally the vessel was changed into a white connective tissue strand. Treatment had no effect, and the eye remained totally blind. There was no endocarditis or other affection which could have accounted for the embolism, which was plainly owing to the attack of influenza.

Brieger[230] has observed two cases where patients saw everything *yellow*, as when santonine is taken. In one of them this lasted for two days, in another four days.

6. The *motor nerves and muscles of the eye* have likewise frequently suffered through grip. There appears to be a slight inflammatory affection of the ocular muscles in connection with this disease, which may be myositis or peri-neuritis. In such cases there may be no other affection of the eye, but simply intense pain on moving them, more especially on attempting to read or to write, when several of the ocular muscles are working together.

The patient is only tolerably comfortable when he keeps his eyes perfectly still, and during sleep.

Eversbusch[197] mentions the case of a physician who found it utterly impossible to read or to write, on account of the great increase in the severity of the pain induced thereby, while he could look for an hour through the microscope without any trouble, the eye being then more fixed and at rest.

In the period of defervescence, *paresis of accommodation* is very common. Hypermetropic persons who have in consequence of their vigorous power of accommodation preserved normal sight, suddenly lose it through weakness of the muscles supervening after the febrile illness; while others who have arrived at the age of presbyopia, and have yet, thanks to their power of accommodation, been able to see well without spectacles, suddenly find the need of divergent glasses.

Vanden Bergh[192] has described three cases of paresis of the ocular muscles, which came on very shortly after the feverish attack. In one case the right rectus superior, and in the two others the left rectus externus were affected. All the cases recovered. Unthoff,[144] Pflüger,[145] and others have seen all forms of paralysis of the motor nerves of the eye, such as external ophthalmoplegia, bilateral paralysis of the third, bilateral paralysis of the fourth, and the same affection of the sixth nerve separately. It is difficult to say whether

these palsies are nuclear or peripheral, but the latter appears more probable.

Callan[225] has described a case of exophthalmos and external ophthalmoplegia following grip. The patient was a storekeeper, aged 44, a man of intemperate habits, and of a very nervous, excitable disposition, who had been in good health until he had an attack of grip, at Christmas, 1889, which left him very weak and harassed by an annoying cough. Two weeks after the onset of that affection, he suffered from a most unbearable headache, which lasted twelve hours; the right eye then "began to bulge out of its socket," and in twenty-four hours the left commenced to protrude similarly. For thirty-six hours his suffering from headache and cough became so severe that friends watched him closely, fearing he might commit suicide. After both eyes had become exophthalmic, the headache diminished very much, and presently almost disappeared. He could not close the lids nor move the eyeballs. When admitted into the hospital, his temperature was 103°, and the pulse 120. There was mild delirium. A cathartic was given, and after it had operated there was marked diminution in the amount of eye protrusion. The eyelids could be readily shut, and the eyeballs could be moved to a considerable extent. His general condition, however, became worse; the next day the temperature rose to 105°, the pulse to

130; the pupils became contracted and delirium more pronounced; finally coma supervened, and he died on the fourth day, as if from apoplexy. A few hours prior to death the exophthalmos practically disappeared, but the chemosis remained in part. The autopsy showed the meninges adherent to the cerebrum, very dark in colour. Between the dura and pia mater, covering the optic groove, olivary process, sella turcica, and extending laterally over both sphenoidal fissures, there was found a circumscribed sac, holding between three and four drachms of serous fluid. The optic nerves, in their passage into the orbits, were found flattened in the foramina, and fluid escaped from the orbits. In the lateral ventricles, especially in the right, there was a good deal of serum. In removing the brain, an unusual amount of fluid escaped.

G.—Post-Grippal Diseases of the Ear.

Sir William Dalby[235] has lately asserted that "a person with healthy ears has little to dread from influenza so far as the mucous surface [of the cavity of the tympanum] is concerned, but that it may become a serious trouble to one whose ears have formerly been the seat of inflammation." Such a contention is not only *à priori* highly improbable, as we have seen that inflammatory affections of other organs have frequently become developed through grippal infection simply in persons who

had had no trouble in those parts before, but it is also plainly contradicted by the actual experience of many competent aural surgeons who have written on this subject, and who have distinctly stated that in numerous instances of severe post-grippal disease of the middle ear no history of any previous ear-trouble existed. Cases of this kind will be found in the writings of Bock,[236] Bordoni-Uffredizzi,[237] Bowie,[238] Bronner,[239] Chatellier,[240] Downie,[241] Dreyfuss,[242] Eitelberg,[243] Glower,[244] Gradenigo,[245] Gruber,[246] Habermann,[76] Haug,[75] Hermet,[247] Huysmann,[248] Jankau,[249] Karwowski,[78] Katz,[250] Lannois,[251] Löwenberg,[252] Ludewig,[253] Menière,[254] Michael,[255] Politzer,[77] Purgesz,[256] Scheibe,[258] Schwabach,[257] Stewart,[259] Tschudi,[260] and others.

With regard to this point, the observations of Bowie[238] appear to be particularly interesting and convincing. Bowie practises in a portion of East Central Africa where the natives are hardly ever affected by inflammation of the ear or throat, yet of 150 cases of influenza which came under his care in Blantyre, thirteen were complicated with otitis media. Again, Downie[241] has seen a considerable number of cases of middle-ear inflammation following influenza in those who formerly had been quite free from any affection of the ears; and this statement is emphatically endorsed by Stewart,[259] who has been himself thus afflicted, and by Hugh Jones,[260a] who states that he has met with a considerable

number of cases of influenza in which there supervened during convalescence great pain in the ear, followed by a purulent discharge therefrom, in persons who had previously had no ear troubles of any description. Haug[75] lays stress upon the fact that, in eleven cases of hæmorrhagic bullous myringitis which occurred in his practice, and which resulted in perforation of the membrane, not one of the patients who suffered from this affection had at any previous time had the slightest trouble with the ears. Finally, a decisive fact is that in the German army[134] there occurred not less than 290 cases of otitis media in men who would simply not have been enlisted if they had previously shown any ear-troubles, and who may therefore be presumed to have been perfectly sound before, although this is not actually stated.

There are few cases of grip where symptoms pointing to congestion of the various structures of the ears, such as pain, vertigo and tinnitus, are absent. Such signs are easily accounted for by congestion of the internal auditory artery, which is a branch of the basilar artery, and supplies the membranous labyrinth. These symptoms habitually disappear with the fever. More serious troubles may, however, appear either on the first day or two, or about eight or ten days after the invasion of the disease; and we find then the same pathological processes which have already been described as occurring in the brain, the eyes, etc.: viz., hyperæmia, hæmorrhage,

inflammation, and embolism. It should be remembered that pathogenic bacteria are always contained in the cavity of the mouth, and that these may, aided by the congestion and catarrh which is caused by irritation of the fifth nerve, penetrate into the Eustachian tube, and then act as excitors of inflammation in the middle ear. In other cases, however, the origin of the inflammation has appeared to be owing to capillary embolism, and metastasis from an inflamed lung, while in some it appears to arise simply from a special localisation of grippo-toxine.

That the various forms of otitis which have been seen during the late epidemics of grip, are not simply co-incidences, but are actual complications of the feverish attack, is seen when we compare the number of cases which have occurred in hospitals in years which were free from grip, with those which applied for admission during the late epidemics. Thus Gruber[246] found the following numbers :—

			Catarrhal form.	Purulent form.
No grip.	December,	1887 . .	20	10
No grip.	,,	1888 . .	32	36
Grip.	,,	1889 . .	115	103
No grip.	January,	1888 . .	6	17
No grip.	,,	1889 . .	59	59
Grip.	,,	1890 . .	138	186

Lacoarret[262] has found similar data in the aural hospital of Bordeaux, where there were four cases of otitis media in December and January, 1887-88, six in the same period of 1888-89, and thirty-two in 1889-91.

1. *Myringitis Hæmorrhagica Bullosa.*

Several observers have, on the first or second day of the disease, seen a severe hæmorrhagic inflammation of the membrana tympani, which is on examination found to be intensely reddened, livid, cyanotic, and studded with dark blisters or blebs of the size of a lentil or split pea, containing a sanguinolent serum. The subjective symptoms are pain and deafness, but there is no vertigo. The pain is sometimes insignificant when compared with the intensity of inflammation, but at other times excessively severe; and this probably depends upon the point whether the inflammation is confined to the membrane, when there is not so much pain, or spreads to the cavity of the tympanum, when the suffering of the patient is apparently excruciating. In some cases the external ear suffers likewise, there being periostitis of the external meatus, and œdematous swelling. The course of this affection is generally rapid. Spontaneous perforation takes place, sometimes in ten or twelve hours, with profuse clotted discharge, after which the pain is relieved, and otorrhœa continues for some time.

Haug's[75] observations on this hæmorrhagic inflamma-

tion have already been mentioned (p. 68). Schwabach[257] has seen it in 22 cases out of 72; and Tschudi[260] considers it to be characteristic and specific for grip. Politzer,[77] however, states that he has seen similar appearances in cases of small-pox and typhoid fever.

2. *Otitis media*, either in its catarrhal or purulent form, frequently begins somewhat later, viz., on the tenth, twelfth, or fourteenth day of the disease. It is generally ushered in by pain and a recrudescence of fever, and accompanied with deafness and giddiness. Rupture of the membrane is an early symptom in the purulent form, but even after perforation and considerable discharge of purulent matter has taken place, the suffering may still continue unabated. Pain is, indeed, more severe, and lasts longer in grippal otitis than in the ordinary form of otitis media, and may go on after the inflammation has subsided, as a kind of otalgia, which gradually becomes intermittent. In general, the time which elapses between the first occurrence of the pain and the discharge, is very short; and in some cases the discharge has been the first symptom. The streptococcus and staphylococcus aureus have been found in the pus of this form of otitis.

Abscess in the mastoid process is a not uncommon sequence, and attended by extreme pain and tenderness in the part, as well as by symptoms of septicæmia. In one of Politzer's[77] cases death supervened twenty-four

hours after the abscess had been opened. In that case the autopsy showed diffuse meningitis, which had existed for several days, but did not appear to be connected with the otitis. The pus of the meningitis contained diplococcus. A case of abscess of the brain after otitis media, which was cured by operation, has already been described (p. 141). Gruber[246] has seen a case in which the otitis appeared to lead to meningitis and cerebral abscess, with a fatal result.

Metastasis and capillary embolism may not only cause the aural affection, but may also proceed from the abscess in the mastoid cells, and affect remote parts. An instructive case of this kind has been recorded by Hugh Jones.[260a] The patient had previously had no ear-troubles of any kind; the feverish attack ran the usual course, and was not severe. Indeed, the temperature had been normal for some days, when he was suddenly seized with acute pain in the left ear; and shortly afterwards there was a free discharge of pus from the meatus. This continued abundant for a few days, and the patient appeared better; but presently it became scantier and then ceased almost completely. He now complained of intense pain in some of the joints, more especially the knees. The temperature went up to 104°, and the case looked like one of rheumatic fever. Moist heat was now applied to the ear, and salicylate of sodium given internally, when the discharge from the ear returned, and

the fever subsided; but in a few days there was considerable swelling and redness over the mastoid process. The patient was now very feeble, and altogether in a most unsatisfactory condition. The mastoid process was opened, the pus evacuated, and the diseased portion of the bone removed. After this the patient rapidly improved; the wound healed kindly, and in a few months the hearing on the affected side had been completely restored.

3. *The internal ear* is likewise apt to be affected by influenza. Bowie[238] mentions a case where the tinnitus was distressing from the very first, and altered continually in character, and it persisted after the hearing in the affected ear had again become as acute as in the healthy ear. Lannois[250] has seen several similar cases. A man, aged 22, became deaf during a severe attack of grip, but had no discharge from the ear. When after a fortnight he first got out of bed, he was seized with severe vertigo, so that he fell to the ground. He did not vomit, but continued to feel giddy, and was obliged to turn his eyes to the ground, which otherwise appeared to him swaying from one side to the other. He often staggered like a drunken man, and objects seemed to be spinning round from the left to the right side. By means of the air-douche the right ear got well, but in the left ear there remained total deafness to air- and bone-conduction. There were also constant subjective noises, like steam rushing from a kettle. The

membrane was throughout grey, and slightly drawn in, but normally movable.

In another case the patient, aged 23, had already previously suffered from slight deafness, tinnitus and vertigo. After an attack of influenza, however, these symptoms increased, and the deafness was nearly complete. Local and other treatment had no influence upon the condition.

Instances in which previous stationary ear-disease has been rendered worse by grippal infection have been very numerous. Sir William Dalby[235] has drawn attention to cases in which perforation has existed for years, and where the patients have had very little trouble either with their hearing or in other ways, and where increased deafness and discharge supervened after an attack of influenza. In other cases where the tympanic cavity had become dry and ceased to secrete purulent matter, even after exposure to ordinary cold, etc., troublesome secretion has likewise recurred after grip.

H.—Post-Grippal Diseases of the Organs of Circulation.

Pericarditis and *endocarditis* have only rarely occurred as complications of the feverish attack. In the German army,[134] where 55,263 men suffered, altogether six cases of pericarditis and four of endocarditis have been noticed.

One of the latter affection showed at once symptoms of septicæmia and proved fatal. On inspection there was found profuse serous effusion into the pericardium, the chest, and the abdominal cavity; great thickening of the left ventricle; yellow soft deposits, of cauliflower appearance, on the aortic valves, which closed up that vessel almost altogether. They could be easily removed and teased with the fingers. The internal surface of the heart and great vessels was throughout quite smooth, and did not show at any point signs of previous disease. The lungs were œdematous and the spleen enlarged.

Fürbringer,[262] Neidhart,[263] Leichtenstern,[126] and Tyson,[264] have also described fatal cases of pericarditis and endocarditis.

Gordon Black,[332] on the other hand, who has seen four cases of endocarditis, which all got well in a short time, considers the grippal form of this disease to be "erythematous and evanescent as compared with the plastic and more permanent mischief of rheumatic fever;" and states that during the valvular complication it seems quite impossible to distinguish influenza from rheumatic fever by any examination of the heart.

Pawinski[264] has seen endocarditis chiefly in persons who had already been subject to heart disease previous to the feverish attack. One of his cases was that of a naval officer, aged 29, who had disease of the aortic valves from previous rheumatic fever. He had just

finished a long and tedious journey when he was taken with influenza, the principal symptoms being fever, cough, and severe headache, with pain in the left side and the spine. There was a spasmodic kind of cough, but no lung affection. At the end of the first week the fever gradually subsided, but there was now evidence of further enlargement of the heart; a systolic murmur at the base became louder day by day, with a pulse of 140 to 160, oppression on the chest, and restlessness. There was albumen in the urine; the patient lost strength, the temperature eventually rose to 104°, there was delirium, the physical signs of further increase of heart-disease became more marked, and the patient died after having been in a comatose state for some time.

In another case, in which the patient suffered from previous mitral disease, the attack of influenza led to a feverish condition which lasted eight weeks, and was owing to endocarditis which affected other portions of the heart, and led to a fatal issue at the end of that time.

Pawinski distinguishes two kinds of grippal endocarditis, a benign and a grave one.

In the benign form there is long continued fever, which is, however, not severe, as the temperature, with the exception of the first two or three days, does not exceed 102°. The fever however lasts from three to five weeks. The general condition of the patients is not

unsatisfactory, for some of them did not even keep their beds. In the graver form the evening temperature was 104°, and remitted somewhat in the morning; in some cases it exceeded 104° in the evening, and was normal in the morning. In such cases there was generally profuse perspiration, and shivering fits, as in pyæmia. The spleen was enlarged; there was prostration, insomnia and delirium. Of three such cases two had a fatal issue. It did not appear that the gravity of the attack of influenza had so much to do with the severity of the cardiac affection as the previous state of health of the patient. Where this had been unsatisfactory, the malignant form was observed, while patients who had been in good general health, suffered less severely. The aortic valves appeared to be the seat of predilection, and the endocarditis was seen chiefly after the nervous, not so much after the catarrhal, form of influenza. Pawinski finds the characteristic feature of this affection in the long duration of the fever, and the great tendency to ulceration. Endocarditis in the course of rheumatic fever lasts a much shorter time, and has no tendency to ulceration.

Thrombosis and embolism of important bloodvessels have frequently occurred after grip. Duchesneau[266] relates the case of a man, aged 58, who was, a fortnight after the feverish attack, taken with thrombosis of the bloodvessels of the left foot and the lower third of the leg. Two months subsequently these parts were com-

pletely mummified, the line of demarcation being indistinct. The principal organs appeared to be healthy, but the action of the heart was very irregular. The limb was amputated, but the edges of the wound assumed a sphacelous appearance, fever and delirium set in, and the patient sank. Out of nine such cases, which all occurred in somewhat aged males, death took place in five.

Highet[267] has described a case which occurred in a girl, aged 24, who made a good recovery from the feverish attack, being able to be out of doors by the end of the week. The first day she was out she had to climb rather a steep hill, when she suddenly experienced a severe pain in the calf of each leg, especially the right. She took to her bed again, and had a similar attack on getting up three days after. The foot then became stiff and swollen, the skin over the instep blue and tender, and the left foot presently began to be similarly affected. Eventually gangrene affected the end of the right fourth toe, and to a somewhat lesser extent the little toe and the dorsum of the big toe, while the end of the fourth left toe was rather inflamed. There was a distinct line of demarcation across the middle of the plantar surface of the two. The sloughs presently separated, and the raw surfaces healed after the patient had been three weeks in the hospital.

Eichhorst[128] mentions the case of a medical practitioner

of vigorous constitution and good health, who was, during convalescence from pneumonia, taken with the most fearful pain in both legs, which also became anæsthetic. The feet and lower portion of the legs became livid, black, and cold, showing symmetrical gangrene. The patient refused amputation, and died within a week after most fearful sufferings.

Similar cases have been recorded by Sydenham,[268] Senator,[124] Gerhardt,[269] Cammerer,[270] Cross,[271] Johannsen,[272] and others.

A kind of *intermittent œdema* has been noticed by Krause, in the case of a man who shortly after the feverish attack was found to have his left leg discoloured and swollen. The limb appeared livid, and had a circumference of 42 cm. against 36 cm. in the right leg; while the left thigh measured 53 cm. against 46 cm. in the right. The patient was very desponding, and afraid of having to submit to amputation, and the degree of the œdema varied greatly according to the mental condition of the man, thus clearly showing its neurotic origin.

I.—Diseases of the Organs of Respiration.

While rhinitis as a complication or sequel of grip appears to be rare, *laryngitis* is tolerably common, and may according to B. Fraenkel,[273] be seen as late as

two months after the feverish attack. He has seen pharyngitis in eight cases, with angina lacunaris, and inflammation of Luschka's tonsil. In thirty-three cases of laryngitis there was hoarseness and complete aphonia. The mucous membrane appeared to be reddened and greatly swollen. In two cases there was hæmorrhagic laryngitis; and in two others subglottic laryngitis. In eighteen cases of muscular paresis, the transverse muscles were affected six times, the interni ten times, and the transversi and interni together twice. The reddened portions of the mucous membrane showed dirty-white patches, but without a difference of level. Such patches appeared chiefly in the middle and anterior portion of the vocal cords, and remained there for two or three weeks. A more or less conspicuous area was found round about them presently, and loss of epithelium was noticed, in consequence of which the laryngoscope gave an indistinct image of the mucous membrane. These patches are believed to be a fibrinous infiltration, and although they may not be pathognomonic for grip, they are nevertheless important on account of their frequency as sequels of it. This form of laryngitis has a tedious course. It was only quite gradually that the white patches became smaller, the losses of epithelium replaced, and that the vocal cords assumed their normal appearance. Lublinski,[274] who has seen sixty-three cases, has also been

struck by this singular white colouration, which he considers to be owing to superficial necrosis of the epithelium. He also saw hæmorrhagic laryngitis, which is otherwise extremely rare, in four cases as a sequel of grip. All these patients were males. Landgraf[275] has seen rhinitis only once in 216 cases of grip, but laryngitis more frequently. In one case the feverish attack of grip was followed by pneumonia which lasted a fortnight. Two days afterwards there was complete aphonia, difficulty of deglutition and stridor. The laryngoscope showed an extensive œdema of both ary-epiglottidean folds. This was incised, giving exit to serum and a little blood, with great relief in four days. It has also struck him as singular in cases of pharyngitis, where the patients complained of extreme difficulty of swallowing, that there was very little objective change to be seen.

Schaeffer[280] records the case of a man, aged 25, who about eight days after the attack of grip suddenly became hoarse. The next day there was so much dyspnœa that tracheotomy had to be performed. There was much swelling of the ary-folds, and intense congestion of the mucous membrane. There were two small abscesses over the right ary cartilage. After these had opened, a similar abscess appeared in the left ary region, and perforated spontaneously. The expectoration was most offensive. The swelling then rapidly subsided; on the twelfth day after tracheotomy

the canula could be removed. There was also paresis of the soft palate, so that fluids regurgitated through the canula and the nose.

Similar observations have been made by Wolfenden,[276] Chauvel,[277] Herzog,[278] Koch,[279] Le Noir,[281] Duflocq,[282] Petrina,[283] and others.

The peculiarities of bronchitis, broncho-pneumonia, and pneumonia in grip have already been dwelt upon (p. 55). Much additional information on these points may be gleaned from the writings of Jaccoud,[284] Kahler,[285] Sokolowsky,[286] Fiessinger,[287] Osthoff,[288] Pantlen,[289] Finkler,[290] Danco,[291] Duponchel,[292] Letulle,[293] Méguin and Veillon,[294] Haddon,[295] Hebert,[296] Gilbart Smith,[297] Kundrat,[298] Aufrecht,[299] Barnes,[300] Combe,[301] Chauffard,[302] and others.

Extreme rapidity of breathing, or *tachypnœa*, as a sequel of grip, has been noticed by Gaipa and Titone.[283a] This is a form of neurosis which is generally seen only in hysterical women, and is often intermittent. I have seen a case in a girl aged 18, who had many other symptoms of hysteria, and was affected with tachypnœa at once as soon as a man entered her room, while her breathing was quiet and regular when only females were present. In the case of the two Italian observers the patient was a man, aged 25, who had been quite well previous to the attack of grip, but was, when it was over, seized by intermittent tremor of the legs. After this

had disappeared he complained of attacks of violent pain in the epigastrium and rapid breathing, there being at least 120 inspirations in the minute. During sleep the breathing was quiet and regular. The man recovered by the use of hypnotics in the daytime.

An attack of grip may or may not have a prejudicial influence on pre-existing *phthisis*. Some observers, such as Strümpell[303] and Heubner,[304] have seen consumptive persons emerging from the feverish attack without an aggravation of their chest-symptoms, while Demuth,[305] Sokolowsky,[131] Wiltschur,[79] Vogel,[306] and others have, on the contrary, found that the phthisis advanced with rapid strides after influenza. Hæmoptysis, hectic fever, and other symptoms supervened or became aggravated. In the Obuchow Hospital, at St. Petersburg, the number of consumptive persons admitted during the epidemic was double that of the usual rate, and the number of deaths from phthisis was absolutely and relatively increased during the whole of that time. Some of these persons, although suffering from tubercle, had been fairly well and able to attend to their occupations before the attack of grip, while after that the lung-trouble became very much worse, and there was rapid failure of general power. Three patients with galloping consumption averred that they had been quite well until seized by grip.

The compilers of the report on grip in the German

army state that tuberculosis has occurred very frequently in men after grip, and explain this partly by the inflammation of the respiratory organs giving a favourable soil for the subsequent immigration and development of the tubercle bacilli, and partly by phthisis, which had been latent, becoming manifest in consequence of the severe nutritive disturbances which accompany the attack of influenza. They have seen altogether thirty-six such cases, seven of which are fully described. A man, who had been perfectly healthy before becoming gripped, had the feverish attack on December 28th, 1889, and died of galloping consumption twelve days afterwards. The whole right lung was found studded with tubercular masses of the size of cherry-stones, forming a kind of detritus. In another case pleurisy on the right side came on very soon after grip; the effusion was tolerably quickly absorbed, but signs of pulmonary catarrh presently supervened in the same side, and eventually attacked the apex, causing dulness on percussion. The man, who had had no trouble at all before he became gripped, now suffered from distressing attacks of cough, and the microscopical examination of the sputum showed the presence of numerous tubercle bacilli. Some instructive cases of this kind have also been observed by Maillart.[48]

Much rarer complications of grip are abscess and gangrene of the lungs and pneumothorax, cases of which

have been described by Fürbringer,[262] Drasche,[104] and Kundrat.[298] Kahler[285] found that the formation of abscess in the lungs generally coincided with purulent pleurisy, and ran a very rapid course. In one case death ensued in four days. The pus of the abscesses was found to contain an abundance of streptococci, and sometimes the staphylococcus pyogenes aureus.

J.—Diseases of the Digestive Organs.

The gastric form of influenza has been already described (p. 71). There are only rarely particular complications or sequels seen in the digestive organs with or after other forms of grip.

Glossitis sometimes occurs quite suddenly, evidently from nerve-irritation (p. 63). The tongue is then seen to be red, painful, and swollen to treble its size, so that it can hardly find space in the mouth, and the patient has great difficulty in talking and eating. In some cases this glossitis has disappeared simultaneously with the fall of temperature, so that the tongue almost suddenly re-assumed its previous size. Herpes labialis has occurred together with it. A case of this kind has been described by Ramon Guiteras.[307]

Parotitis has been seen by "Rusticola"[308] in three old women. In each of them there was intense swelling of the gland, with great pain, dropping of the jaw, and general prostration. In two, death occurred speedily,

without suppuration. In the third, death seemed imminent, but the case lingered on with bronchitic and pneumonic complications. Both glands suppurated twice, and when last seen, the patient's recovery was still doubtful.

In the German army, twelve cases of parotitis have occurred as sequels of grip.

Enteritis, as a form of gastric influenza, has already been mentioned (p. 72). Weichselbaum[3] has recorded a case which had a fatal issue. In the German army there have been nineteen cases of enteritis, one of which proved fatal. This man was suddenly, while on sentry duty, taken with fever and pain in the limbs. The next day there were purpura spots in the lower limbs; and a few days afterwards there was abdominal pain, and vomiting of fæcal matters and decomposed blood. This went on for eight days, there being no action of the bowels during that time. Then there were sudden alvine discharges, at first of a pitch-like matter, and afterwards of fresh and bright red blood. There was a slight improvement, and the vomiting ceased; but presently the patient became worse again, and on the sixteenth day developed pneumonia. He died on the seventeenth day from collapse. The autopsy showed petechiæ in the epidermis, pleura, pericardium, and more especially in the intestinal mucous membrane. The whole of that membrane was much thickened, and

had a greyish-green colouration. In the abdominal cavity 100 ccm. of a turbid reddish-brown liquid were discovered.

Hæmorrhage from the bowels has not been uncommon. Fürbringer[262] has seen the case of a consumptive woman who almost immediately on being gripped, began to have bleeding from the rectum, which continued for some days, in spite of treatment. She died of exhaustion.

Three cases of acute *peritonitis* and four of acute inflammation of the *liver* have occurred in the German army with grip. *Icterus* catarrhalis has likewise been observed.

Diabetes, possibly owing to an affection of the pancreas, has been seen by Saundby[309] and Fischel.[310] The latter observer's case was one of intermittent diabetes, in a woman whose urine had been previously analysed, and been found free from sugar. On the ninth day, when the fever had subsided, she complained during the night of intense thirst, and could not sleep. The night after that she drank three quarts of liquid, and voided three and a half quarts of urine, which contained 2·5 per cent. of sugar. Within the next twenty-four hours she felt quite well. The evening afterwards however thirst returned, six quarts of urine were voided, containing the same percentage of sugar as before. Quinine was then given, and the eventual result was satisfactory.

Villard[140] mentions the case of a man, aged 45, who had for some time past excreted in his urine about 1 per cent. of sugar. He then had grip, and coughed and spit incessantly for three weeks. After this the quantity of sugar had risen to about 3·3 per cent. At the same time signs of infiltration of the apex of the lungs had become manifest.

K.—Diseases of the Urinary Organs.

1. *Nephritis.*

Piggott[45] relates the case of a man, aged 42, who had an acute attack of nephritis from which he quickly recovered, but it is not very evident that the case originated in grippal infection.

Mansel Sympson[311] has seen a case of acute hæmorrhagic nephritis in a boy, aged 11, which rapidly got well. The mother of this boy had suffered from gravel, and his grandmother from renal calculus, so that there was probably hereditary weakness of the kidneys. Leyden[36] mentions a case of total necrosis of the kidneys, such as is caused by closure of the renal vessels.

Fraser[312] has described the case of a boy, aged 9, in whose family no predisposition to kidney disease existed. There were seven other children, all of whom suffered from influenza during the first three months of 1891. On March 2nd the present case commenced with the symptoms of influenza of ordinary type, except that it was

accompanied by epistaxis. On the 3rd he was better, but worse again on the 4th, when his urine was noticed to be very scanty, and of an appearance described as "like beef-tea." He remained in much the same condition until the 7th, when he was seen for the first time. The urine was very scanty, and smoke-coloured. It contained albumen, the amount being estimated by Esbach's tube at 0·2 per cent. Microscopically, the deposit was seen to consist of blood and granular casts, and fatty epithelium from the bladder and pelvis of the kidney. On the 8th his temperature had risen to 101·8°, which depended apparently on the commencement of an attack of bronchitis, showing itself by stethoscopic signs, and by pain and oppression in the chest. There was trifling œdema of the ankles. The urine, still very scanty, was acid in reaction, sp. gr. 1026, and contained 0·1 per cent. of albumen and a deposit of blood, hyaline and epithelial casts. Some of the deposit was stained and examined for bacteria, numerous micrococci being found. On the 9th his temperature had fallen to 98°, and his pulse was weak, and accompanied by a thrill. He had little cough and no pain, and his chest condition had improved. The urine, however, contained much more albumen, it being approximately estimated at 1·1 per cent. The amount of albumen now varied from time to time, but on the 28th every trace of it had disappeared.

Weichselbaum[3] found in the urine of a patient with severe grip and albuminuria Fraenkel's pneumococcus, this being one of the secondary bacteria of influenza. Cases of nephritis which ended fatally have been described by Ribbert[1] and Strümpell,[303] while Krehl[313] and Anton[314] have seen cases in which the kidneys recovered within a few days. Krehl has seen no hæmaturia, but Drasche[104] and Strümpell have each seen one such case. In the German army ten cases of nephritis were seen, none of which proved fatal.

2. *Cystitis* seems to be a rare complication. Only one case of it occurred in the German army, but Widal,[315] Fraenkel,[316] and Frossat[324] seem to have met with several such cases. The latter observer states that the symptoms "of acute severe cystitis vanished in six or eight hours" (?) in two women who had been in perfect health previous to the feverish attack. Three other persons who had suffered from chronic catarrh of the bladder before, found themselves worse through influenza, but the symptoms were also soon relieved in these cases. Fiessinger[317] found that when blisters were used in the gripped, cantharidic cystitis was more apt to follow than in other persons.

3. *Paralysis and Atony of the Bladder.*

Bilhaut[325] has seen a case of retention of the urine

which lasted for a week, and Brakenridge[107] mentions two cases of paralysis of the bladder after grip.

A case of this kind has also been seen by Liégois,[318] but it was complicated with paresis of the lower extremities, and was therefore probably owing to congestion of the lumbar portion of the cord. Similar cases are recorded in the older writings of Saillant[319] and Michel.[320]

I have already mentioned (p. 53) that in some cases there is *polyuria* and a large excess of phosphates in the urine during the feverish attack. In most cases, however, the *urinary secretion* is diminished during that time, and the density of the urine is increased through an excess of urea and uric acid. The urine has a high colour, from the presence of the chromogene of urobiline and modified bile-pigments, while in more severe cases there is an abundance of urobiline present. Occasionally there has been suppression of urine (anuria), which continued for from twelve to sixteen hours. It generally does not contain any albumen where the feverish attack is mild or of medium severity, while in the graver forms albumen may be present, more especially when the case becomes complicated with pneumonia. That the urine occasionally contains sugar has already been mentioned (p. 268.)

L.—Diseases of the Male Sexual Organs.

Orchitis has occurred shortly after the feverish attack, probably in consequence of capillary embolism from metastasis. Harris[321] has described the case of a man, aged 67, a widower, who was recovering well from the feverish attack, when on the fifth day of the illness he was found to have inflammation of the left testicle, while the temperature, which had already come down to normal, was again 102°. This patient had never got out of bed, had had no trouble with his urine, and there could be no other cause but grippal infection. He recovered in about three weeks. Similar cases have been described by Briscoe,[322] Kelly,[323] and Neidhart.[263] One case of epididymitis occurred in the German army.

M.—Diseases of the Female Sexual Organs.

I have already described the hæmorrhages which are apt to occur from the womb during the feverish attack (p. 69). Gottschalk[326] has seen several cases of a peculiar form of hæmorrhagic endometritis. In one of these patients the adnexa of the uterus had been previously removed by operation. There was profuse metrorrhagia, which lasted from five to eight days; the womb was swollen, flabby, and as soft as during pregnancy, the cavity of it being elongated by from 1 to

1½ cm. The vagina was normal. In two cases he saw abortion in the third and fourth month. R. Müller[327] has seen uterine hæmorrhage in forty-five out of forty-eight cases of non-pregnant women; and Amann,[328] Banks,[329] Wright,[330] Trossat,[324] and Lwow,[346] agree about the great tendency to abortion which is seen in gripped women, more particularly in the earlier months of pregnancy. Amann[328] states that in parturient women grip has a bad influence in rendering the labour-pains unusually severe, and withal ineffective. It is also apt to lead to mental depression and maniacal attacks.

Purdon[328a] has seen a case in which a healthy multipara became gripped about twelve hours after parturition. The lochia were suppressed on the third day, and on the fourth a small patch of pneumonia appeared, with high fever. Death ensued on the seventh day of the illness.

N.—Cutaneous Affections.

Influenza with a rash appears to have, on the whole, been uncommon. Yet Hubert Bristowe[331] states that in 20 per cent. of the 175 cases which he treated at King Edward's School there was a distinct papular rash, the papules being slightly larger than in scarlet fever, and much of the same colour. The papules often contained serum, which occasionally became purulent.

The skin round the papules was of a bright red colour. The rash was mostly confined to the face and neck, but often seen on the arms and hands, and sometimes on the shoulders and chest. It itched much; after two or three days the bright colour faded, and it became scaly. In one case the rash was all over the neck, chest, legs, shoulders, and arms, and was thought to be scarlatinal, but the temperature never rose above 100·4°, and the other symptoms of grip, including pains in the limbs, were present. There was no sore throat, and the tongue was only slightly furred. In two days the rash was almost completely gone. In the cases in which the rash was best marked no drugs had been given, the rash appearing as one of the earliest symptoms.

Gordon-Black[332] likewise states that he has seen a rash having all the outward appearances of measles, and which was at first general all over the body, but after a few days appeared to be concentrated on the left side of the chest, where also the neuralgic pains eventually became fixed, being so severe as to cause the most intense suffering, more especially in the evening. Similar cases have been seen by Karwowski,[78] and Guiteras.[333] The latter describes an erythema which was so strikingly like the scarlatinal rash that, together with the fever, vomiting, the quick pulse and sore throat, the case at first sight looked like one of scarlet fever. The rash, however, affected only the head,

chest, and upper extremities, was not punctuated, and disappeared in twelve hours. Moreover the skin was moist, while in scarlatina it is generally hot and dry. He has seen this erythema so often that he assumes a peculiar "erythematous form" of grip.

Herpes febrilis on the lips and other parts of the face has been seen by Curschmann[333a] in 12 per cent. of all his cases, and by Demuth[305] in 25 per cent; Stintzing and Weitenmeyer[334] found it in 11 per cent., and Bouchard[16] found the streptococcus, pneumococcus, and staphylococcus pyogenes aureus in the effused liquid. Herpes zoster, circinnatus and iris have also been noticed in a certain proportion of cases by Kollmann Bilhaut[325] and Schwimmer[335]; and urticaria has been described by Minauf[336] and Hoffmann.[339]

Erysipelas is probably not directly connected with the feverish attack, but due to secondary infection by its own bacteria, which habitually infest the cavities of the body, but are not allowed to enter the blood, unless the patient is enfeebled by the grippo-toxine, and thereby becomes a fertile soil for other infections. Lemoine[337] has described a case in which there was a treble infection, viz., first grip, then mumps, and finally erysipelas. The patient was a soldier who entered the hospital on December 26th, with all the characteristic symptoms of grip, viz., severe headache and backache, stiffness in all the limbs, and a kind of generalised

bronchitis without localisation, leading to fits of coughing with mucous expectoration. On January 3rd he was taken with a painful and considerable swelling in both parotidean regions, which lasted a week and was accompanied with an evening temperature of 104° and a morning one of 103° for two days. After several days of complete apyrexia, he was taken again with intense fever, 104°, and the next day an erysipelatous redness appeared at the inner corner of the right eye. The next few days this redness spread to the nose, the orbital region of the other side, and then rapidly to the whole of the face. After a time he recovered. In another case where the issue was fatal, areas of lobular inflammation were found in the lungs, which contained a great quantity of streptococcus. It should be added to this that there were at the time no cases either of mumps or of erysipelas in the hospital. The German army surgeons[134] report four cases of erysipelas altogether.

Blaschko[338] has seen *Lupus erythematodes* following directly upon an attack of grip, entailing loss of hair on the scalp; and *alopecia areata* has been seen in connection with influenza by Mapother[340] and Williamson.[341]

O.—Diseases of the Blood.

Reiner[342] has recorded a case of acute pernicious anæmia, which occurred in a married lady, aged 30,

who, having always enjoyed good health, fell ill of influenza which lasted three weeks, severe bronchitis being one of the most prominent features of the attack. The acute symptoms gradually subsided, but a striking general muscular weakness remained, with severe and rapidly progressive anæmia. A month afterwards there were shivering fits and a temperature of 103°, which continued for a week. It then fell, and remained at 97° to 98° until death, which occurred three weeks after the second attack from exhaustion. Two days before death the patient had three maniacal attacks. The spleen, which had at first been normal, had afterwards become enlarged; and there was slight albuminuria, with a scanty but incessant blood-tinged vaginal discharge. The blood was very thin, pale, non-coagulating; the red corpuscles being pale and markedly less numerous than in health. The post-mortem examination showed extreme pallor of the organs, excepting the spleen, which was of a rich red colour and almost diffluent. The serous cavities were filled with effusions; the lungs were œdematous, the heart flabby, and the endocardium studded with ecchymoses. The blood was everywhere fluid, with but few and small-sized clots.

P.—Diseases of the Bones and Joints.

Witzel[343] has seen periostitis in a number of cases as a sequel of grip. An infant, seven months old, had in-

fluenza, and developed a tender swelling of the left leg, just above the ankle. Incisions were made, and a thin, grey matter containing streptococcus was evacuated from the fibula, which was found denuded to some extent. A few days afterwards a similar periostitis affected the thigh-bone, from which sanguinolent pus containing streptococcus was taken.

A working man, aged 22, had swelling of the knee a fortnight after influenza. Puncture gave a yellowish matter with chain-coccus. The same was found in some abscesses which had to be opened later on.

Senator[124] has seen multiple synovitis, and Böse[344] mentions a case of purulent periostitis, with necrosis of the tibia. Pflüger saw periostitis of the right upper jaw, which spread to the lachrymal sac. Möser[345] has described two cases of periostitis occurring in patients who had been perfectly well previous to the attack, on the third day of which there was sudden violent tooth-ache, swelling of the mucous membrane of the hard palate, and necrosis of the bone.

CHAPTER IV.

GRIP'S ORIGIN AND MODE OF SPREADING.

The origin of influenza is, like that of other specific contagious fevers, such as small-pox, measles, and scarlatina, at present shrouded in obscurity; and the hypotheses which have been brought forward concerning this matter have thus far thrown very little light upon it. Tessier[347] states that influenza grows on Russian soil, and that when not actually raging, it is at least always smouldering there. He traces the origin of the distemper to the peculiar mode of life of the people, who dislike fresh air, and are locked up in over-heated rooms or hovels; to the flatness of the ground, its consequently bad drainage, and sodden condition when the thaws of spring set in; to the abominable dirt allowed to accumulate everywhere in farm-yards and villages; to the rivers which suddenly rise and overflow their banks, and on falling leave a putrid mud behind; and finally to the strepto-bacillus, which is fond of breeding in this mud. Unfortunately this theory does not explain why, seeing that such conditions as here described always exist, grip appears epidemically only at long and irregular intervals.

Moreover, similar circumstances are met with in other countries, and yet do not seem to give rise to epidemics of influenza.

Another theory on the origin of at least the recent epidemics of grip is that which attributes it to the inundations which took place in Manchuria[348] and other parts of China in 1888 and 1889. It was stated at the time that about a hundred thousand inhabitants had perished in the floods, while vast numbers of drowned cattle and uprooted trees had contributed to form a focus of decomposition sufficient to poison the atmosphere of the whole country, and thus to create an epidemic. The fine yellow mud which was left after the evaporation of the water during the heat of summer, was said to be carried up to the skies in such masses as to obscure the sun; this mud contained spores which were disseminated by the winds all over the surface of the globe, and thus engendered grip. It was also argued that, while we speak of "Russian influenza," the Russians call the same disease the "Chinese cold," and are unanimous in tracing its origin to China. This hypothesis is controverted by the fact that China, so far from being the first to suffer by the epidemic, only began to be affected after the English mail steamer had arrived in Hongkong in January, 1890, having cases of influenza on board, as had also the American mail transports which arrived there in January and February, 1890.

A third hypothesis is that brought forward by Harries,[349] who ridicules the idea of a bacillus imported from Germany, and is convinced that the recent epidemic of grip was caused by the tremendous eruption which occurred at the volcano of Krakatoa, in the Straits of Sunda, in 1883. An enormous quantity of dust was then shot up into the air to a height of twenty-four miles, and he has calculated that this dust might have taken as long as six years and three hundred days, that is, nearly seven years, to fall to the earth again. He thinks that this was the cause of the remarkable sky-glows which were witnessed in 1889, and also of the epidemic of influenza! Harries believes that his theory will explain the failure of the usual prophylactic and therapeutic treatment of grip, but he will probably find few persons willing to follow him into the mazes of such wild speculations. It has been shown by a writer in *Nature*[471] that the atmospheric waves produced by that great eruption travelled completely round the globe in twenty-four hours in a direction from East to West, and in thirty-five and three-quarter hours in the opposite direction. The dust from Krakatoa was carried westward at the rate of about seventy-five miles an hour, or round the world in ten days. If, therefore, this dust were the cause of the epidemic, the influenza should have been prevalent at once, and not have taken six or seven years to break

out. Another reason for rejecting Harries' hypothesis is that influenza does not prevail in the vicinity of Vesuvius, or Etna, or the Lipari Islands, where volcanic eruptions on a small scale are constantly going on; and if Krakatoa dust were really the cause of it, influenza ought to have been prevalent everywhere long ago.

A further suggestion which has been thrown out is that the influenza epidemic may have been owing to the same disease which sometimes attacks horses and other domestic animals. There is no doubt that both at St. Petersburg and London the outbreak of the epidemic was preceded by the prevalence of what is known as "influenza," or "pink-eye," amongst horses, which is rather common where large numbers of horses are crowded together in stables. Yet it is notorious that horses suffer more or less from "pink-eye" almost every year; and that the epizootic of 1889 which preceded the epidemic of grip of the same year was a comparatively slight one, while highly destructive epizootics have occurred in recent years without being followed by an epidemic of grip in men. Influenza in horses would also seem to be a distinct malady, resembling but likewise greatly differing from, human influenza. It does not seem to be communicable from the one species to the other. Persons having to do with horses have not been earlier or more severely affected by grip than others, and in many places where grip has recently

raged, there has been a complete absence of "pink eye" in horses. This question, however, still remains in suspense, and can only be satisfactorily settled by bacteriological investigation, which, as far as I am aware, has not yet been carried out. If Pfeiffer's bacillus were found to be the exciting agent of "pink eye" in horses, the identity of that complaint with human influenza would have been established, but clinical facts point to the existence of a different bacillus for the "pink-eye."

The suggestions that domestic pets, such as cats, dogs and caged birds, breed the disease, or that migrating birds have brought it to England, or that it has been imported by Russian oats, hardly deserve mentioning.

While, therefore, the origin of influenza remains unknown to us for the present, we have a large amount of precise and valuable information about its mode of spreading. Indeed the way in which this disease begins, pursues and finishes its career, is so peculiar, and so evidently under the control of certain definite laws, that it seems difficult to misunderstand them. Yet even now we hear much of an "air-borne miasma or contagion," just as in former years plague, cholera, yellow fever, small-pox, and even hydrophobia, were believed to be caused and spread by morbid atmospheric conditions.

The evidence which has gradually accumulated with regard to grip's mode of spreading, seems to me irresistibly to point to the following conclusion:—

Influenza is a contagious disease, owing in the first instance to the development of Pfeiffer's bacillus outside the human system. Under the influence of certain conditions, with the nature of which we are as yet unacquainted, this bacillus increases and multiplies to such an extent as to become the efficient agent in causing influenza. After this has once commenced, it easily spreads from one person to another, in the same way as measles, small-pox, or scarlet fever, either by actual contact or by "fomites," that is, infected materials, such as clothing, or goods of any description which may have become imbued with Pfeiffer's bacillus. With regard to its progress, grip follows the established lines of human intercourse, and spreads at about the same pace as men are in the habit of travelling at those times and places where it becomes epidemic. It has nothing to do with meteorological conditions; advances independently of climate, season, wind and weather; and affects large masses of the population at the same time, for the following reasons:—1st. Because it has a very short period of incubation, viz., about two days. 2nd. Because men are exceedingly susceptible to infection by this particular bacillus. And, 3rd, Because the bacillus is propagated not only by persons who are ill in bed, but by many people who have the complaint in a mild form, and therefore continue to move about and pursue their ordinary avocations, thus forming focuses of infection for all those who may happen to come in contact

with them. Germs or spores of the bacillus may remain undestroyed for a considerable time, and may, under the influence of favourable conditions, lead to fresh multiplication of the bacillus, and therefore to fresh outbreaks of the disease.

Regard for space and the patience of my readers prevents me from going through the whole of the evidence with regard to the above which is now available; and I would refer all those who wish for trustworthy information on most of these points to the excellent, laborious, and well-digested official report by Parsons.[350] I am glad to be able to add much important evidence, all pointing in the same direction to that given by Parsons, more especially with regard to the spread of influenza in the German Army and in the Swiss Alps. The incisive writings of Sisley[351] may also be studied with advantage, although his proposals of isolation for preventing the spread of the epidemic, appear to me to be utterly impracticable.

For the historical student the works of Thompson,[85] Hirsch,[352] Haeser,[353] Schweich,[92] Kusnezow and Hermann,[93] Brochin,[35] Most,[354] Gluge,[355] Zuelzer,[356] and Kratz,[357] will afford a rich mine of information; while those who may be interested in the immense variety of opinions which have been expressed in the discussion which has been going on during the recent epidemics, will find much food for reflection in the writings of Assmann,[358] Arnould,[359] Antony,[360] Aikman,[58] Anton,[80] Audibert,[361]

Berry,[362] Bampton,[363] Boobbyer,[364] Brakenridge,[107] Barnes,[365] Hubert Bristowe,[331] Bertillon,[366] Bruce,[367] Bartholow,[368] Bickenbach,[369] Buckingham,[370] Bungeroth,[371] Burlureaux,[372] Clemow,[373] Comby,[231] Combe,[301] Cezilly,[374] Chasseaud,[375] Cory,[376] Drasche,[104] Dauchez,[377] Daugny de Désert,[377a] Dunlop,[378] Dupin,[379] Délepine,[380] Dubrulle,[381] Duflocq,[382] Dowd,[383] Danz,[384] Davis,[385] Descrosiers,[386] Desnos,[387] Dück,[388] Dyrenfurth,[389] Emmison,[390] Eade,[391] Edson,[391a] Fischel,[392] Fitzgerald,[392a] Fleischer,[393] Fox,[394] Francis,[395] Fyffe,[396] Green,[397] Giron,[398] Grasset,[399] Hall,[400] Hermann,[401] Heyfelder,[402] Heinemann,[403] Haller,[404] Jaccoud,[405] Jakins,[406] Korssakow,[407] Krakauer,[408] Krehl,[409] Krafft,[410] Low,[411] Lunz,[412] Lyon,[413] Layet,[414] Lemaistre,[415] Leubuscher,[416] Liebreich,[417] Monisset,[418] Moore,[419] Mitchell and Buchan,[420] Mac Donald,[421] Mason,[422] Meier,[423] Merbach,[424] Müller,[425] Nothnagel,[426] Noott,[427] Olivier,[428] Ornstein,[429] Prout,[430] Proust,[431] Preston,[432] Petrina,[433] Pacanowski,[434] Pollak,[435] Price,[436] Quinton,[437] Reinhold,[438] Rosenbach,[439] Renvers,[440] Robertson and Elkins,[441] Reuss,[442] Russell,[443] Rause,[444] Röwer,[445] Ruhemann,[446] Schärer,[447] Scheller,[448] Shattuck,[449] Straub,[450] Scholtz,[451] Seitz,[452] Siegfried,[453] Snell,[454] Squire,[455] Speyer,[456] Strahler,[457] Sykes,[458] Tueffert,[459] Tannahill,[460] Thresh,[461] Toppin,[462] Tibbles,[463] Twombly,[464] Thomson,[465] Umpfenbach,[466] Ucke,[467] Vogel,[292] Windsor,[468] Wolff,[469] Wiltschur,[293] and others.

Influenza, then, follows and always has followed the

great highways of human intercourse, the well-trodden routes of commerce and traffic; and the rate at which it has travelled has been in direct proportion to the rapidity of the means of communication which happened to prevail at any such times. Thus when people were in the habit of travelling on horseback, in coaches, and in sailing-vessels, the spread of the epidemic was proportionately slow; its tour round the world took several years to accomplish. At present, when we are using fast steamers and express trains for locomotion, this round is accomplished in double quick time. Yet even in the recent epidemic of 1889-90, it was shown that in Central Asia, where the means of communication are comparatively undeveloped, the rate of progress resembled the pace of a horse; while as soon as the epidemic reached a great railway station—Moscow—full railway speed was at once attained. Another important fact is that in the German Army grip required in 1833 three *months* for infecting the largest garrisons from east to west. In 1889-90 the same malady only took about three *days* for invading the whole of the largest garrisons, and about five weeks for affecting all those which suffered, including the very smallest and those situated in out-of-the-way places.

Let us now take a short glance at the progress of the epidemics of 1889-90-91, and the peculiarities which they have exhibited.

The epidemic commenced, as Heyfelder[402] has authoritatively informed us, at Bokhara, in Central Asia, in May, 1889. This observer happened to be at Bokhara at the time, and was informed that there had been a bitterly cold winter and a rainy spring. The inhabitants having, on account of the severe cold, been obliged to spend their money rather on fuel than on food, were depressed in health from want of nourishment, and the severe fast of Ramadan further reduced their strength. All of a sudden influenza appeared, killing large numbers of the natives, while all the members of the Russian legation, as well as the Russian officers, soldiers and other Europeans were ill in bed, and no one was there to nurse the patients. The first cases which were observed appeared to belong to the nervous form of grip, while after a time catarrh of the respiratory mucous membrane was added to the nervous symptoms. Heyfelder found that those who lived in the basements and ground floors of houses fell ill before those living in the higher stories, and that the cases were most numerous in schools, barracks, and similar institutions. Those Europeans who were able to do so, left Bokhara as soon as they possibly could, travelling westwards along the stations of the Central Asian Railway, for change of air, and in order to get better food and nursing, and took the disease with them. The ordinary caravans which are in the habit of travelling from Bokhara eastwards, were the

means of spreading the distemper along the various post-stations, and it thus became distributed in different directions over wide tracts in Siberia, and was found, in the beginning of October, at Astrakhan, in European Russia. In the desolate regions of Central Asia grip required fifteen weeks to travel over a distance of 1,600 miles. Thus the epidemic reached Ssaljan, in the Caucasus, only on the 25th of October, sparing not a single dwelling-house there, while in Tomsk, where it was called "Siberian fever," it was present on October 17th. Influenza was about the same time announced to have arrived at Sebastopol, Kaluga, Vilna and Moscow. But after it had reached Moscow, from where there is quick railway communication with St. Petersburg and the rest of Europe, the distemper began to spread in a very different fashion. Clemow[373] states that the first cases occurred in St. Petersburg and Cronstadt in the beginning of November, while Drasche[104] maintains that grip was already epidemic in St. Petersburg about the latter part of October, that the disease reached its height in November, and ceased in the beginning of December. Anyhow it spread from St. Petersburg by rail to Berlin, Cologne and Paris, while ships took it in another direction to the German ports of the Baltic, such as Dantzic, Stettin and Kiel, from where it was taken in a few days to Denmark, Sweden and Norway. About the same time Vienna was invaded, and became a great focus for

further infection. In Germany the provincial towns became affected after the capital had taken the lead, and the soldiers who were allowed to go on furlough for the Christmas holidays carried the disease everywhere into the smallest villages. From Cologne grip was taken on to Brussels, which handed it on to the whole of Belgium and Holland. A ship which left Amsterdam about that time for the United States, took the malady there, where it located itself first in the Eastern, and afterwards in the Western States. It appeared in Central America in January, and in South America in February, 1890. To the latter part, however, grip was also taken directly by a ship which left Bordeaux for Buenos Ayres. From Paris it spread to the interior of France, and also to England. The first scattered cases occurred in London in the middle of December; the epidemic began about Christmas, 1889, and reached its height in January. In the large provincial towns it attained its climax in February. Scotland was infected about the middle of December by a crew from Riga which put into Leith, the port of Edinburgh. In Ireland influenza prevailed generally in the first week of January, reaching its maximum at the end of that month, and in the beginning of February.

From Vienna the disease spread further to the Balkan States and Constantinople, where it arrived about Christmas, while smaller places in the interior of Austria were subsequently infected. From Constantinople it

went to Athens in a few days, and thence proceeded to Italy and the northern coast of Africa, Fez, Tunis, etc., and to Spain. The islands in the Mediterranean, such as Corsica and Sardinia, were affected somewhat later than the mainland. In another direction grip travelled from Constantinople to Persia, and from there to India. In February, however, it had already been noticed amongst the troops at Lucknow, and was by the middle of March epidemic at Lucknow, Bombay, Benares and Meerut, while at Calcutta it became rampant in April.

There is no record of any previous epidemic in Ceylon; but on January 30th, 1890, the troopship "Himalaya" arrived from Plymouth with nineteen cases of influenza on board, while there had been 140 cases during the voyage out. A few days afterwards the first cases of grip occurred in the pilot-boatmen employed in the harbour of Colombo, and who had gone on board ship; and a post-office clerk who was engaged in sorting the mails was also laid up. From Colombo it travelled to the planting districts, affecting the labourers in the tea and coffee plantations; while in places up country the distemper commenced among the small traders in the bazaars, and spread from them to the estate labourers and villagers, who came to make their purchases.

To Hong-kong grip was brought in January by the English mail steamer, which had some cases of influenza

on board. It spread gradually in China, attacking half the population of Pekin and other towns, business being in consequence almost at a standstill.

Bowie,[238] who has given an interesting account of the progress of influenza in East Central Africa, found that in Blantyre and its neighbourhood influenza had never within the memory of the oldest native inhabitants appeared in an epidemic form. The natives were much frightened about it, calling it a new disease and a white man's complaint, but not one of theirs. He ascertained that in every instance grip preferred to take the longer but easier route by water than the shorter overland route as the crow flies and the wind blew—in other words, the epidemic followed the route of the greatest traffic, and not the most direct route through the air. Every other fact connected with it also pointed to personal, and not to aërial, conduction.

Low[411] has given an account of an outbreak of influenza on board the Royal Mail boat "Massilia," which left London for Australia on July 24th, and arrived on September 5th at Melbourne, where influenza was then raging. A new passenger came on board there, with symptoms of grip, which then made its tour through the crew and passengers of the "Massilia," new cases occurring about every two days until September 30th, when the largest number of fresh cases was noticed. The way in which the disease spread on

board was highly characteristic. In the forepeak, where some thirty stewards slept, the bunks were arranged round three sides of a square, with a narrow entrance, and a block of four bunks in the centre. All these bunks were three deep. The first case occurred at the entrance on September 28th. On the 30th there were two new cases, one sleeping on top bunk of middle block near No. 1, and the third in one of the forward bunks. The next day the fourth case occurred, next to No. 2; the next day two more, one next bunk forward of No. 4, and the sixth case under No. 2. The next day one in one of the side bunks. The eighth case occurred on October 6th (three days after the last), in a bunk next to No. 5. The next day the ninth case, sleeping in bunk under No. 8; and the last case in the forepeak on October 10th, in bunk under No. 4. With regard to the native crew in the forecastle, they were so crowded together that the wonder was that they did not all get it. Two stewardesses out of three were laid up, one on October 30th and one on November 6th; both had been attending cases.

In Japan an epidemic of grip commenced in February, 1890, reached its climax in April, and died away towards the beginning of the summer. In March the disease had reached New Zealand, and ten or fourteen days afterwards it was in Melbourne and Sydney. From there it spread to South Australia, and

later on to Western Australia, and the epidemic had therefore completed its tour round the world in considerably less than twelve months.

In all these outbreaks it has been noticed that the epidemic progressed in the Northern hemisphere in a direction from east to west, that is, contrary to the prevailing surface winds, and from north to south, while in the Southern hemisphere it travelled from south to north. *In every country the capitals and important provincial centres were first attacked*, and a direct importation into the smaller country towns and villages could in many instances be traced with great certainty. In consonance with this it is interesting to find that in *the French*[359] *and German*[134] *armies the largest and larger garrisons* were likewise always first affected, and that the smaller stations were only invaded after some time; the direction which the epidemic took being in general from north-east to south-west. The stations in Germany which were last of all affected, were those situated anywhere on the extreme boundaries of the country, either towards France or Russia, and in out-of-the-way places.

In the German army a number of garrisons remained altogether unaffected by the epidemic, more especially in Silesia, and in places which are at the greatest distance from the principal direction which the epidemic took. In Parchim, where the 18th regiment of Dragoons was

stationed, the civil population was infected, but the regiment escaped. The barracks of this regiment are situated at a distance from the town, in a completely isolated position, and open towards all sides. The soldiers had no intercourse with the infected civil population. The wives and children of the non-commissioned officers who lived in the barracks were spared, while cases of grip occurred in three families of non-commissioned officers which resided in the city of Parchim. Again, a company of Fusileers quartered in the elevated Cyriaxburg, near Erfurt, was spared, while in the Martini barracks, which are situated in the middle of the town, in which the other companies of the battalion were quartered, grip spread through all floors and rooms indiscriminately.

I now proceed to report a number of authenticated individual cases, showing that grip spreads by contagion. Some of these occurred in the German army, others in the civil population of England, France and Germany; and perhaps the most interesting of all are those which happened in the caretakers of Swiss mountain resorts, who are during winter more or less completely isolated from the rest of the world.

In Pasewalk, a small place in Pomerania, where there had previously not been a single case of grip, an officer arrived from Berlin gripped. The staff-surgeon who attended on him, and his orderly, next fell ill. Then

followed the wife and child of the surgeon, and a friend of theirs, who was generally with them. After that a regular epidemic commenced.

In Belgard, where the disease was likewise imported from Berlin by an officer, his aide-de-camp became gripped on the third day. In a few days the other inhabitants of the same house followed suit; then the staff-surgeon took the disease, and finally grip broke out in the residence of the commander of the garrison, which was opposite to the house first infected.

In Colmar two regiments, the Dragoons No. 14, and Infantry No. 112, were stationed in different barracks. The civil population and the Dragoons had suffered for some time, while the infantry regiment had been spared. One Sunday morning men of both regiments met in church, and after that the epidemic broke out in the infantry regiment as well. I might add dozens of similar instances which are given in the Official Report on Grip in the German Army.

In many of these small epidemics it was noticed that the epidemic spread in the barrack from room to room, and indeed from bed to bed. Every man caught it from his nearest neighbour, and the more crowded the dormitories were, the more numerous were the victims of grip. While in some cases old hospital patients were spared when fresh cases of grip were admitted into the same wards, it was, nevertheless,

noticed that in most cases not only the old patients, but also the nurses and attendants, became affected soon after cases of grip had been admitted. The cavalry and horse artillery suffered more than the infantry, probably because the horsemen get more heated during their practice, and are thus more liable to catch cold, which is believed to predispose to influenza.

The following are a few striking instances of evident contagion which have occurred in the civil population :—

A lady residing in the neighbourhood of Paris, went with a friend into the Magazin du Louvre, in which influenza had broken out, and bought, amongst other things, a fur-collar for her coachman. She returned the same evening to the country. This was on a Friday. Both ladies got influenza two days after, and each occasioned a small epidemic in her circle. The one living in Paris gave it to her brother, who fell ill on the Sunday, to her husband who got it on the Monday following, a maid and a little girl had it on Thursday, and the same evening another servant was taken. The other lady, who lived in the country, gave the fur-collar on the Saturday to her coachman ; on Sunday she was taken, while the coachman became gripped on the Monday. On the Wednesday the lady's child was taken ; on the Friday its nurse ; on Saturday a maid, a footman, and another nurse had it ; the next Sunday

another child got it, and only the master of the house and the cook escaped.

Windsor[468] has described a similar small epidemic which occurred in his own house, and where it was quite clear that the malady was directly transmitted from one patient to another, and that no person caught it in any other way. It was brought into the house by a charwoman, who assisted the housemaid in cleaning. Three days afterwards the housemaid had it; two days afterwards a lady companion who had attended to her; two days subsequently the mistress of the house; four days afterwards the master, and two days afterwards another lady, who had been staying in the house were affected.

Pollak[435] relates an interesting case in which grip spread from father to daughter, and where, the latter having been isolated, no fresh cases occurred in connection with her:—

In December, 1889, when grip had not yet made its appearance in Prague, a girl aged 8, was suddenly taken with rigors, severe headache, prostration, muscular pains, and fever (104·4°). The patient was strictly isolated. On the third day catarrh of the respiratory organs appeared, and it became clear that the case was one of typical and moderately severe grip. The other members of the family were spared, but that they had not acquired immunity was shown by the circumstance that later on,

when grip reigned pandemically in the place, and it was impossible to avoid the contact of diseased persons, the rest of the family got it. On further inquiry into the case, it appeared that the father of the girl, who was a commercial traveller, had just before been in Silesia and Moravia, where influenza had then established itself, and that he had there suffered from a "feverish cold" from which he had not recovered by the time he returned home. A person coming from an infected district, and being himself infected, therefore gave the disease to another person, who, being isolated in the beginning of the illness, did not herself become a centre of infection. The epidemic became almost universal at Prague about Christmas-time, when crowds of people frequented the shops, theatres, and churches, and infection spread by contact.

A most convincing tale is told by Proust[431]:—A French mail steamer left St. Nazaire for Vera Cruz on December 2nd, 1889. On departure the health on board was perfect. On December 5th she stopped at Santandar and took up a first-class passenger coming from Madrid, where influenza was then raging. This man showed all the symptoms of the disease on the 6th. On the 10th the medical officer of the boat was laid up with it; on the 12th a steward suffered, and then a regular epidemic broke out, affecting 201 out of 436 persons on board.

Antony[360] has observed a similar occurrence at the Hospital Val-de-Grâce, in Paris. A few patients suffering from influenza were admitted and distributed in a ward somewhat at haphazard, amongst other patients whose cases were comparatively mild. One to four days after admission of the new comers, eleven of the old patients had caught the influenza. Eight other patients who had been isolated, on account of their illness being of a more severe character, escaped. Similarly Bäumler[47] found that a lady who arrived in Freiburg from Paris, brought grip there; and when a patient suffering from it was admitted into a ward where there were other patients, some of these latter got it a day or two afterwards, and very frequently just the one suffered whose bed was opposite to the gripped patient.

The case of the training ships at Brest, as related by Daugny de Déserts,[377a] is likewise remarkable. There are three such ships stationed at Brest: "La Bretagne," "Borda," and "Austerlitz," lying near one another. On December 11th, 1889, an officer on board "La Bretagne" received two large boxes from a Paris house. He opened them himself, took the things out, and had influenza three days afterwards. The next and following day his wife and three servants were laid up with it. These were the first cases which occurred at Brest. On December 14th, when still ill, this officer went on board "La Bretagne," and spent a day and night there. On

the 16th, an aide-de camp had it, on the 17th a regular epidemic broke out on the ship, affecting from twenty to forty-five men per diem. Of a crew of 850, 244 suffered. All the officers and sergeants who had it and were allowed to go ashore, communicated the disease to their families. The chief interest of the case, however, lies in this, that "La Bretagne" was the only one of the three training ships which suffered. There was not a single case on board either the "Borda" or the "Austerlitz," although all three were lying close together. An "air-borne miasma or contagion" would surely have been able to spread over such a short distance as from "La Bretagne" to the two sister ships.

Tueffert,[459] when speaking about grip's mode of spreading in Switzerland, mentions that while Neufchatel, Le Locle, Chaudefonds, Biel, and Berne had many cases, Montbéliard remained free. A native of the latter place then visited, on December 9th, an influenza hospital in Paris, and fell ill with grip on returning home on the 13th. On the 17th his two daughters, on the 19th his son, on the 20th a friend of the latter, on the 21st the father of the friend, and on the 23rd the brother-in-law of the latter were affected. On the same day the wife of the first patient and three other relations fell ill with it. In the meantime, however, the disease was brought to the place independently by two merchants who had been staying in Neuchâtel and Solothurn, where grip was then raging.

With regard to the question of contagion a peculiar interest attaches to outbreaks of grip in certain isolated small communities, and it is to these that the partisans of the "air-borne miasma" have generally pointed triumphantly as proof of their assertions. Thus Ruhenann[446] states that the stream of malaria in the atmosphere must be enormously high, as the highest mountain-peaks were affected by it equally with the lowlands. In Switzerland grip was not only found in the plains and along the railway-stations, but also in the ice-bound and deserted summits of the Alps. This delusion has been finally dispelled by the careful investigations of Seitz,[452] which have thrown an entirely different light on this matter, showing that we cannot be too careful in making a detailed examination of such cases before drawing our conclusions from them. It is perfectly obvious, from Seitz's researches, that the caretakers of the mountain-resorts in Switzerland, which are deserted during winter, became gripped, not through that wonderfully "high cloud of air-borne miasma" which has been supposed to traverse the atmosphere, but simply by contagion from one person to another. This observer has satisfied himself in numerous instances that the caretakers are in the habit of descending from their mountain-fastnesses at stated intervals into the valleys below, most generally on Sundays, partly in order to carry their milk and butter into the lower regions for

sale, and partly to relieve the tedium of their solitude, and to visit their friends below. That such places as the Hospice on the top of the Julier pass, which is nearly 7,000 feet above the sea-level, should have suffered from influenza is easily accounted for by the circumstance that a diligence runs there day by day, and may thus carry not only mails and passengers, but also microbes. But matters are different with other places, which are during the winter entirely shut off from the world. With regard to Davos, it was shown that a visitor arrived there gripped on December 12th, 1889, in order to spend the winter at that place. He at once infected the whole community. This case was described at the time with full details in the "Schweizer Correspondenzblatt" by a reliable authority.

On the Grimsel no living soul had arrived during December, 1889. The caretaker of the Hospice, which is 5,600 feet above the sea-level, went down into the valley on December 21st to see his master, who lived in Guttannen, and who was then lying ill with grip. He returned to the top of the Grimsel, had grip two days afterwards, and gave it to his fellow caretaker, who was living there and had not left the place.

There is an Observatory on the Säntis, 7,500 feet high, where everybody remained well, because nobody went either up or down during the duration of the epidemic. Between December 19th, 1889, and January 31st, 1890,

there was there absolute separation from the rest of the world, and not a single case of influenza occurred.

What happened on the St. Gothard, 6,342 feet, clearly shows that not only gripped people, but healthy persons, and objects ("fomites") which have been in contact with the sick, may become carriers of Pfeiffer's bacillus. There are two caretakers stationed during the winter on the top of St. Gothard. One of them went down in January to Airolo, which is a railway-station, and where everybody was then gripped. The man returned the next day, and remained well himself, but on the ninth day afterwards his fellow caretaker, who had not been away, developed a severe attack of grip. As the incubation of the malady in other cases is so much shorter, this appeared at first sight puzzling and inexplicable; but on closer investigation it turned out that the man who had gone down into the plain had, on his return, taken off his Sunday clothes and hung them up in the bedroom, which was common to both men. His clothes remained there for a week in contact with the Sunday clothes of the second man, who put his own on the next Sunday. On the Tuesday afterwards he was gripped!

On the Eggishorn, 6,600 feet, the caretaker was spared; but, after having gone down to his home in the valley, where, out of seventy inhabitants, forty-six were down with influenza, he became gripped on the third day.

On the Riffel-Alp there are two caretakers, who were in the habit of going down to Zermatt on Sundays for a change. On January 12th they visited a friend who was gripped. One of these men became gripped the second day, and the other the third day.

In the Hospice of the Great St. Bernard, 7,400 feet, there were twenty-two inhabitants, of whom twenty-one had grip. The first to become affected was the Prior, who had most to do with the travellers and the correspondence; after him the rest of the fathers suffered.

On the Righi Kulm, 5,400 feet, there was a small settlement quartered for the winter. They had all been in perfect health until an artist arrived amongst them from Lucerne with grip, and then all the people, one only excepted, became gripped. Similar occurrences happened on the other stations of the Righi. *Sapienti sat.*

Parsons[350] mentions some interesting particulars which he has ascertained with regard to similarly situated persons, viz., deep-sea fishermen and lighthouse-keepers, who by their occupation are for long consecutive periods almost or entirely debarred from communication with the rest of the world. It results from his inquiries into this matter that both classes of men just mentioned have been exempt from influenza, with the exception of a few cases contracted ashore, or by communication with others.

The objections which have been brought forward against the contagious theory of grip are easily answered.

1. In the first place it is stated by the partizans of the "air-borne miasma," that the disease spreads more rapidly than human beings can travel. Colin, indeed, has gone so far as to state that the infection travels with the rapidity of light or electricity, which is, of course, arrant nonsense; but what has been already stated in the present chapter, when describing the progress of the recent epidemic, utterly refutes the notion that grip travels even twice as fast as express trains do. The first cases occurred in St. Petersburg in the latter part of October; in Berlin, on December 2nd; in Paris on the 5th; in Munich on the 10th; and in Brussels on the 11th. Any one who will consult the continental Bradshaw, may convince himself that human beings can travel much faster than that. The transmission of the distemper across the ocean was also slower than the ordinary rate at which mail-steamers proceed; for the epidemic took six weeks to reach the United States, while New York can be reached from St. Petersburg in less than a fortnight by rail and steamer. It took rather more than two months to reach the Cape, three months for South America, four months for India, five months for New Zealand, and ten months before it appeared at St. Helena and Mauritius. All these places may be

reached by the ordinary routes in half the time that was taken by the epidemic.

2. In the second place it is stated that influenza commences suddenly, and that whole populations are struck down as it were by a lightning stroke. This idea has been already refuted by Sir Thomas Watson,[470] who stated fifty years ago that "although the general descent of the malady is very sudden and diffused, scattered cases of it, like the first droppings of a thunder shower, have usually been remembered as having preceded it." In fact, careful inquiry has shown that before the outbreak of the epidemic, or pandemic, there were always preliminary cases from which infection was contracted. In connection with this it should be remembered that the period of incubation is very short, and that in some cases the attack is so slight that it may be easily overlooked. In London there was, before the recent epidemic at Christmas, 1889, a succession of isolated cases for about three weeks before large masses of the population became affected, and the same observation has been made in the other European capitals.

3. It is further asserted that, if influenza were really contagious, every one ought to have it. Those who say so apparently forget that not every one is struck down with scarlet fever, which is universally admitted to be a contagious disease, even if fully exposed to the infection. Some persons, and even whole families, appear to have

the power of resisting any contagion. I know three generations of a family resident in London, not a single member of which has had either measles, or scarlet fever, or small-pox, or chicken-pox, or whooping cough, or diphtheria. On the other hand, it has been shown that persons occupied out of doors are generally the first affected; for instance, the bread-winner, who goes out to business or work, is attacked before the wife and children; and going out means, as Parsons has well remarked, more frequent opportunities of coming in contact with infection than one would have when staying at home. In the suburban districts around London the first cases were generally in the men who went to business in town every day, their wives and families being next attacked, and the locally employed population of tradesmen and artisans later still. Medical men and nurses have greatly suffered, and railway and post-office officials have often been the first to be affected, as was the case at Brighton, Dorchester, Newcastle-on-Tyne, Reading and Swansea.

4. It has been stated that in many instances influenza has occurred without any source of infection being known, and that it must, therefore, have been owing to atmospheric transmission. This objection may be met by pointing to similar cases in admittedly contagious diseases, such as small-pox and scarlet-fever, which it is often impossible to trace to a previous case. Yet no

one will for that reason assert that in such instances the virus has been created *de novo*. Again, it must be remembered, that many cases of influenza are so mild as to escape detection. People during such times feel chilly, become easily fatigued, have a slight cough and sore throat, are disinclined for work, lose their appetite, etc., but have no real feverish attack, and soon recover their usual health. Such persons, however, may at the time be carriers of Pfeiffer's bacillus, and are able to hand it on to others. Immunity is, indeed, as Metschnikoff has remarked, very frequently only "recovery which is taking place from the very onset of the disease." Persons, therefore, who are going about at a time when influenza is prevalent, have numerous chances of coming in contact with unrecognised cases of the malady.

The contagionist theory of grip finally explains the fact which has so frequently been observed, that in public services and establishments, more especially in large drapery houses, such as the Louvre in Paris, etc., where large numbers of persons are employed in enclosed spaces, the cases have been more numerous than where people have been employed in small establishments or in the open air. With the aid of the same theory we can also readily understand why, in institutions, more especially boarding-schools, where the people are brought much into intimate communication with one another, the epidemic has spread more quickly,

prevailed more largely, and reached its end sooner, than in others, such as prisons, lunatic asylums, convents, etc., where the inmates are habitually kept more secluded from each other.

Influenza Conveyed by Fomites.

Those cases which it is impossible to account for by personal contact with a gripped patient may probably always be explained by conveyance through fomites. I have already mentioned such a case, which occurred in a Swiss caretaker; and there can be no doubt that Pfeiffer's bacillus may be sent by post, conveyed by merchandise, and occasionally by domestic pets.

A German officer, stationed in Germersheim, in the Grand Duchy of Baden, received a parcel from a Russian town in which grip was then raging. Soon after he had opened it he became gripped, and his family followed suit. Such an occurrence explains those few cases where ships' crews have been affected suddenly at sea, without having touched grip-stricken ports or received patients on board, no doubt through articles which had previously become impregnated with Pfeiffer's bacillus having, at some time during the voyage, come in contact with the crew, and thus caused an epidemic to break out. Parsons states that the postmaster at the village of Paignton contracted grip from a foreign letter, and caused a local epidemic to break out in that village.

Since December, 1889, influenza has always been more or less with us, falling and rising again alternately, but never disappearing altogether. While, in the first epidemic of Christmas, 1889, chiefly men of outdoor occupations, and the frequenters of churches, theatres, concert-rooms, schools, and colleges were affected, grip has subsequently selected the stay-at-home people, and any that it had previously spared. Those endowed with particular susceptibility have had the disease twice or even three times, while others with little or no susceptibility have escaped altogether, however much they may have, in one way or another, come in contact with Pfeiffer's bacillus. On the whole, however, a certain average degree of immunity has been established in the community. In addition to this, a considerable number of aged, weakly, and tubercular persons have been cut off; and I therefore consider further outbreaks of extensive epidemics of grip in the immediate or near future to be highly improbable. While I know it to be unsafe to be a prophet, I would nevertheless venture to predict that the present generation is not likely to witness again such outbreaks of influenza as those of Christmas, 1889, and 1891.

CHAPTER V.

THE DIAGNOSIS OF INFLUENZA.

THE diagnosis of grip rarely offers serious difficulties. It is true that the disease may begin with the symptoms of otitis, meningitis, enteritis, scarlatina, puerperal fever, measles, a simple feverish cold, and other acute affections, and may in its further course resemble rheumatic fever, ulcerous endocarditis, typhoid fever, and septicæmia; but the history and attendant circumstances of the case, and the fact that an epidemic of grip is, or has been lately prevailing, will generally lead us on the right track. The principal thing to remember with regard to the protean forms which the feverish attack is apt to assume, is that the *storm which sweeps over the system is generally violent but short;* and where there are doubts about the diagnosis, it is better to reserve your opinion about the nature of the case, and wait for another twenty-four hours, after which the atmosphere will generally have sufficiently cleared to allow you to see how the land lies, and to recognise and appreciate the actual state of matters. Moreover, Pfeiffer's and Kitasato's researches have now enabled us to render the diagnosis certain by a bac-

teriological examination of the expectoration from the bronchial tubes, when, if the case be one of influenza, immense quantities of the bacillus of grip (p. 5) will be discovered. This bacillus is, as we have seen, never met with in ordinary bronchial catarrh, nor in other acute affections, but exclusively in grip. Its presence keeps pace with the course of the disease; it becomes rarer, and finally disappears with the cessation of purulent bronchial secretion. In cases of the nervous or gastric form of influenza, where there may be no cough or expectoration, a drop of blood taken from the finger of the patient, in the way described above (p. 6), should be examined, whereby the diagnosis of influenza may be made with certainty where the clinical symptoms alone are doubtful.

The diagnosis of the complications and sequels of grip has to be made according to the general principles of diagnosis, in addition to which we have to find the link connecting the disease with the parent affection. This is occasionally difficult in cases where the feverish attack has been slight, and therefore the history is not very clear. In such instances the pulse will be found to be a reliable guide, as it is generally quick and of low tension after grip, through paresis of the pneumogastric nerve. This I have often found the only symptom by which the grippal sequel could be distinguished from the ordinary form of the same affection. We may also have in

doubtful cases suspicions of a grippal origin, when the development and course of the disease have proceeded with unusual speed. This relates particularly to general paralysis of the insane (p. 94) and to diseases of the spinal cord which become developed after influenza (p. 147).

An infectious disease which does not occur in the temperate zone, but only in the tropics, and which bears a wonderful resemblance to influenza in many respects, is *dengue;** and this seems to me the proper place to enter into the question which has been lately so much discussed, whether grip and dengue are one and the same distemper or not. The writings of Sandwith,[472] Peter,[473] Ringwood,[474] Scottowe,[475] Godding,[476] Le Brun,[477] Villard,[140] Diamantopulos,[478] and others show that there is still considerable difference of opinion on this subject.

That the two diseases are not identical, as has been assumed by several observers, is clearly evident from the experience of Scottowe,[475] who has seen and studied both grip and dengue together in the Fiji Islands, where they were epidemic in 1885-6, and where he had no difficulty in distinguishing one from the other. Scottowe adduces evidence to show that dengue is, like grip,

* The name "dengue" is by some said to be derived from Hebrew, and to signify "burning"; while others state it to be Arabic, and to mean "extreme prostration."

propagated by personal intercourse and not by atmospheric agencies.

Grip and dengue have likewise this in common, that they spare no sex, age, or race, but affect all persons indiscriminately. Both are contagious, and break out after sick persons from an infected district have reached places previously free from them. They are both apt to affect doctors and nurses, and to spread from the first patients to members of the family, and then to others in their neighbourhood. They may both be transmitted by fomites, and, with regard to dengue, it has been particularly noticed that laundresses who were employed by certain sets of families brought dengue to their customers with the clean (?) linen. Relapses occur in both, and one does not confer immunity against the other. The duration of the epidemic of both diseases is generally about three months. The period of incubation is two days in grip, and four days in dengue. Dengue may also, like grip, be transmitted to domestic animals, more particularly horses, cats, dogs, and especially sheep.

One of the principal differences between the two maladies is evidently that grip tends to affect the entire population of the globe, independently of season, heat or cold, or weather of any description. Dengue, on the other hand, is, according to Hirsch,[352] "a highly tropical malady." It tends to spread chiefly at sea-coasts or in the estuaries of large rivers, and has never been

heard of higher North than latitude 41°, or lower South than 21°. Its principal habitat, however, is Syria, Egypt and Greece, while it spares Bosnia, Roumania and Servia. In Syria the epidemics of dengue occur habitually, either in summer or in the beginning of autumn, with an external temperature of 75° or 76°; and they end about the first or second half of December, when the heavy rains which are falling at that time depress the temperature to 50° or 52°. Dengue travels from South to North, while grip travels more from East to West, and from North to South. Dengue, however, spreads much more slowly than influenza.

In both dengue and grip the invasion is sudden, with fever, giddiness, headache, pain in different parts of the limbs, and prostration. It is stated that in dengue the invasion is, if possible, still more sudden than in grip. The fever runs quickly up in both maladies, a temperature of 102° or 103° being most frequently seen; but while in ordinary cases of grip this rarely lasts longer than one or two days, it continues in dengue habitually for from five to seven days. If fever lasts as long as this in influenza, it is owing to complications, such as pneumonia, otitis, etc. The pulse appears to be much the same in the two affections. Headache and giddiness may be severe in both, and there may also be sleeplessness, delirium, epistaxis, and metrorrhagia in both.

A striking difference is observed in the cutaneous manifestations of both diseases. A rash is one of the principal symptoms of dengue, which has on this account been called the "red fever" (fièvre rouge). In dengue there are generally two kinds of rash, the first being temporary and congestive, and affecting chiefly the face and the mucous membrane of the eyes and throat; while the second rash lasts longer, occurs towards the end of the disease, or during convalescence, has different aspects, being sometimes erythematous, at others papular, and affects chiefly the hands, forearms, body and neck, and much less frequently the lower extremities. This rash is followed by extensive peeling of the skin, and such itching that the patients are often kept awake by it all night. The peeling in dengue may continue for three or four weeks, great flakes being shed off the hands and forearms, which never happens in influenza.

No doubt different kinds of eruptions may occur in grip (p. 274), but they are generally evanescent, while in dengue the second kind of rash and its consequences may constitute an important symptom for weeks together.

The pain of grip is no doubt often severe, but that of dengue is reported to be severer still. It is also said to last longer in dengue, and to continue for some time after convalescence. In both diseases there may be pain in the head and dorso-lumbar region of the spine,

and in the muscles of the eyes, more particularly in the levators of the lids, but in dengue, the principal seat of the pain is in the knees and calves, and it is therefore in Arabic called abou-rekabe, *i.e.*, fracture of knees. It is also particularly bad in the hairy scalp, where the pain seems to reside in the very roots of the hair, so that the least touch there is intolerable. In grip there is rarely that incessant desire to turn over in bed and change the position of the body as is stated to be the case in dengue.

The principal complications of dengue are of a gastric character. Total loss of appetite is the rule. The tongue is swollen, furred, and shows the impressions of the teeth; taste is lost to such an extent that the most savoury dishes and the most refreshing drinks remain unappreciated; and thirst is not relieved by drinking. The breath is offensive. Loss of appetite and of taste may continue long into convalescence, and persons who have been great smokers find that they have become utterly indifferent to the "weed" they loved so well before. The chief complications of grip, on the other hand, are bronchitis and pneumonia, which never occur in dengue. The fauces and tonsils are more apt to suffer in dengue, and the larynx and trachea more in grip.

The convalescence habitually lasts much longer in dengue than in grip. If the latter be unattended by

complications and sequels, the patient recovers readily, and is able to resume his occupation; while dengue habitually leaves its sufferers in a state of utter mental and physical prostration, which is apt to be very prolonged.

The principal danger of this stage for gripped patients is found in their apparently speedy recovery, and the consequent desire which is experienced for resuming their usual avocations. The patient who has had dengue does not want to be told by the doctor to do nothing rash, as he feels far too ill to commit any imprudence.

The prognosis in dengue is always favourable, the mortality being practically *nil*, except in the natives of the Fiji Islands, who have the habit of plunging or lying in cold running water during the height of a fever, to which also the appalling mortality in the previous epidemics of measles was almost wholly due. No one in Syria or Egypt ever thinks of doing this, and the patients appear to recover perfectly after a time. Dengue has no sequels, while grip has only too many.

CHAPTER VI

THE PROGNOSIS OF INFLUENZA.

1. *Prognosis of the feverish attack.*—Reliable statistics on a large scale, which may be utilised for the prognosis of influenza, have been furnished by the German Ministry of War.[134] The tables of mortality of the civil population, which are published in London, Paris, Berlin, and other cities, help us very little with regard to this point, because they do not afford us any even approximately accurate data about the number of cases of influenza which happened to be under care at any special time, thus rendering it impossible to draw any conclusions from them with regard to liability to a fatal issue, or to confirmed ill health as a consequence of grip. The Official Report on Influenza in the German army, on the contrary, constitutes a comprehensive and absolutely reliable mass of information, which is complete as far as it goes, and therefore of the utmost value.

This report comprises for the present only an account of grip in the German army and navy between the end of November, 1889, and the beginning of March, 1890, when the distemper had for the time being ceased from troubling. There were altogether 55,263 cases under care during that period. Of these there were

discharged cured 54,805 cases, or 99·2 per cent. of those affected; there died sixty, or 0·1 per cent.; and there were discharged disabled 174, or 0·3 per cent. There were still under treatment for sequels of grip in March, 1890, when the report finishes, 224 patients, that is, 0·4 per cent. of those affected.

In the German Marine there were altogether 477 cases, of which one had a fatal issue.

The average duration of treatment (equivalent to disablement) was 5·65 days. In the first few weeks of the epidemic the time was shorter, the average being only 3·6 days; later on the severity of the distemper appeared to increase, and when it had nearly reached its termination, it suddenly became milder again. This duration of disablement is a good deal less than what Parsons has ascertained for cases which occurred in certain services. Thus it was in—

Custom-house Officers . . .	15·0	days per case.
Bank of England	9·4	,,
London and Westminster Bank .	9·4	,,
Great Northern Railway (Traffic and Goods Department) . . .	7·0	,,

There were important complications and sequels in the German army in 1,735 cases (or 3·1 per cent.), pneumonia standing first amongst them; after which came otitis, neuralgia, pleurisy, and tracheitis. Death took place in—

31 cases of pneumonia.
1 case of gangrene of the lungs.
6 cases of pleuro-pneumonia.
2 ,, pleurisy.
5 ,, tubercle in the lungs.
1 case of œdema of the lungs.
1 ,, bronchitis.
1 ,, meningitis.
1 ,, abscess of the brain.
2 cases of pericarditis.
1 case of endocarditis.
1 ,, pericarditis and rheumatic fever.
2 cases of peritonitis.
1 case of septicæmia after otitis media.
1 ,, hepatitis.
1 ,, enteritis.
1 ,, typhoid fever.
1 ,, suicide during delirium.

The case of typhoid fever could hardly be comprehended amongst the deaths from grip, although the surgeon who has reported it has stated that the course of the disease was most peculiar, and the influence of grippal infection unmistakable. If, therefore, this case is deducted, there would remain 59 deaths, or 0·107 per cent. of those affected, that is about one in a thousand cases, which, considering the severity of the affection, seems to be remarkably little.

It would, however, not be proper to take these statistical army returns as being applicable to the civil population, for matters differ very considerably in the

two sets of persons. I have estimated (p. 84) the proportion of cases in which there have been complications and sequels in the civil population as amounting to about 20 per cent. of those affected. Now we have just seen that in the German army they only amounted to 3·1 per cent.; while, on the other hand, Leichtenstern[126] has, from his experience in the Hospital of Cologne, found the proportion equivalent to 40 per cent. The last mentioned high ratio may be accounted for by the circumstance that persons from the civil population apply habitually for admission into hospitals only when they are severely ill, while the small proportion of complications and sequels in the German army appears to be owing to different causes altogether. In the first instance we have to consider that the soldiers of that army constitute the flower of the nation. None but young men in perfect health are admitted into it, and their constitutional powers are increased to the highest attainable degree by life in the open air, drill, and practices tending to increase the power of resistance of the system to unfavourable influences. The civil population on the other hand contains, not only aged and infirm persons, but also many whose strength has been undermined by unfavourable conditions of life, poverty, and chronic disease. In the second place the soldiers are, as soon as they feel unwell, at once withdrawn from active service. They are, therefore, not

exposed to cold or other injurious influences during the attack, but are from the very beginning under medical care. A great many persons belonging to the civil population cannot afford to rest, or to have a doctor, but have to go on with their work and expose themselves to all kinds of weather while struggling against a most debilitating malady. In consequence of this the course of the disease becomes more severe and protracted, and complications and sequels are more readily induced. It was noticed that even in those soldiers who struggled against the complaint, and would not report themselves on the sick-list at once, grip took a more unfavourable turn than in others.

In the English army the mortality was, no doubt, for the same reasons as those I have just given, also very small, viz., 1·1 per 1,000 cases.

The following tables show the excess of mortality caused by the epidemic in the civil population of Paris and London:—

In Paris there died—

When there was no grip.		When there was grip.	
	Persons.		Persons.
Third week of December, 1888	982	Third week of December, 1889	1,626
Fourth do do. .	955	Fourth do do.	2,374
From December 30 to January 5, 1889 .	970	From December 29, to January 4, 1890 . .	2,683

In the same city there died—

When there was no grip.		When there was grip.
From December 22, 1888, to January 4, 1889 :—		Same time in 1889-90.
Of inflammation of the respiratory organs . .	400	1,541
Of consumption . . .	349	886

In London the deaths from influenza in 1890 were as follows :—

Week ending January 4	. . .	4 deaths.
,, ,, 11	. . .	67 ,,
,, ,, 18	. . .	127 ,,
,, ,, 25	. . .	105 ,,
,, February 1	. . .	75 ,,
,, ,, 8	. . .	38 ,,
,, ,, 15	. . .	30 ,,

The total in the first quarter of 1890 was 558, in the second 47, in the third 16, and in the fourth 27. There was only one week each in the second, third, and fourth quarters of the year where no death from influenza was registered. The mortality directly ascribed to influenza in the last epidemic was therefore much less than that of the last epidemic of 1847-48, where, although the population of London was then very much less, 1,161 deaths occurred in the last quarter of 1847, and 578 in the first quarter of 1848. On the other hand the

epidemic which began in London in April, 1891, was far more fatal. The deaths were not numerous until the third week in May, when they rose to 319, the ratio in the following weeks being 310, 303, 249, 182, 117, and finally 56 in the last week of June. In eleven weeks 1,997 deaths had taken place from influenza, and to these must be added deaths from complications and sequels, and increased rates of mortality from bronchitis, pneumonia, phthisis, and other diseases.

If we were to apply the rate found in the German and English armies to the civil population of London, it would mean that in the year 1890 about 648,000 persons, and in the epidemic of April, 1891, 1,997,000 persons suffered from grip. For the reasons I have already mentioned, it appears to me more consistent with circumstances to assume that the mortality in the civil population was not 1 in 1,000, but 2 in 1,000, thus giving 324,000 cases for 1890, and 998,500 for the epidemic of April to June, 1891.

Apart from the deaths directly owing to influenza, the epidemic has an unfavourable influence on the public health, increasing the general mortality, so that when it reaches its climax, the number of deaths exceeds that of births. In London this excess of mortality amounted—

In the week ending	January	4,	1890, to	423
,,	,,	11,	,,	810
,,	,,	18,	,,	765
,,	,,	25,	,,	260

that is, 2,258 deaths above the average numbers registered during the previous ten years in the corresponding weeks. Although the deaths from grip were still numerous in the last week of January, 1890, yet the total number of deaths had then already fallen to 211 below the average, showing that the severity of the epidemic was spent. The principal diseases which caused the excess of deaths in the beginning of the year were bronchitis (911), pneumonia (465), phthisis (337), diseases of the heart (318), other diseases of the respiratory organs (78), whooping-cough (64), and alcoholism (49).

The prognosis of the uncomplicated feverish attack is, for the civil population, if not quite as good as for the army and similarly situated bodies of men, nevertheless favourable, as shown by the comparatively small number of deaths, when compared with the immense number of cases which have occurred. There is one class of people, however, for whom the prognosis is decidedly bad *quoad vitam*, and that is habitual drunkards, many of whom have succumbed to a simple attack of grip, followed or not by delirium tremens, while numbers of aged and infirm persons of temperate habits have survived it. Hyperpyrexia, however (p. 27), constitutes a real danger to all, while those subject to heart disease may succumb to cardiac and respiratory crises (p. 51). Consumptive persons also run a special risk

(p. 264). For children and young people the prognosis appears in general better than for the middle-aged and aged. The power of resistance of children more particularly is truly wonderful, as they often recover in spite of hyperpyrexia, and such complications as convulsions, bronchitis and pneumonia, and after coma and other ominous symptoms have set in. There is always hope for them where there is no longer any hope for adults or the aged. Above the age of twenty years the prognosis is in general not so good in grip as below that age. With regard to children, their better prospects are partly due to their greater recuperative powers, and partly to the fact that they are more carefully looked after, sooner sent to bed, better nursed and longer kept at home after convalescence than those no longer under the care of their parents.

Many deaths which have taken place in the civil population have unquestionably been owing to imprudence and premature exposure during convalescence.

II.—Prognosis of the Complications and Sequels of Influenza.

1. *Mental Affections* have a fairly good prognosis.

Of my six patients four recovered, apparently permanently, one died, and one recovered temporarily; and similar results have been obtained by other observers.

The first class, comprising neurasthenia, hypochondriasis and melancholia, seems to offer on the whole the best chances of recovery, the mental disturbance being in general of a comparatively slight character. There is, however, the risk of the patient committing suicide when in a state of melancholia, as happened in Snell's and Martin's cases which I have mentioned above (p. 101).

The second class, comprising delirium of inanition, is not quite so favourable in a prognostic point of view, for the physical exhaustion of the patient is much greater, and may lead to fatal collapse. There is also the risk of the patient's passing into a state of dementia after the period of excitement is over.

For the third class no special prognosis can be given, as the issue depends chiefly on the amount of gravity of the neurotic predisposition which may exist in an individual case. Temporary recovery, however, is not uncommon.

Finally, in the fourth class, the prognosis is thoroughly bad unless the case is energetically treated in the beginning on a specific plan. Case 6 shows that, if this be done without delay, the look-out of the patient is fairly good.

2. Post-grippal diseases of the *brain* and its membranes, such as severe hyperæmia, hæmorrhage, inflammation, and abscess are mostly fatal, while in embolism and thrombosis of important cerebral arteries

the prognosis is generally not quite so unfavourable as in the affections first mentioned.

3. Post-grippal diseases of the *spinal cord* and its membranes are hardly ever so rapidly fatal as the analogous affections of the brain. There is more time for the influence of treatment to step in, and on the whole their prognosis is not bad. Although I have lost a case of spastic spinal paralysis (p. 151), another similar case has now almost recovered.

4. Diseases of the *peripheral nerves* are generally amenable to treatment, except those in which, owing to severe poly-neuritis, decided wasting of muscular tissue, with bad electrical reactions, has occurred. Angina pectoris from sudden loss of power in the cardiac branches of the pneumogastric nerve also gives an unfavourable prognosis.

5. Post-grippal affections of the *sympathetic* nerve give fair chances of recovery; and so do

6. The *general neuroses*, such as epilepsy, chorea, etc.

7. Diseases of the *eye* give a fairly good prognosis where only the conjunctiva, cornea, and the ocular muscles are affected; while cases of optic atrophy, optic neuritis, and embolism of the central artery of the retina are generally incurable.

8. Post-grippal diseases of the *ear* often wear an anxious aspect, but have in general a far better outlook than the analogous diseases of the eyes.

9. Post-grippal diseases of the organs of *circulation* vary considerably. The benign form of endocarditis is generally curable, while the ulcerous form is most dangerous to life. Phlebitis also has, on the whole, a bad prognosis.

10. Diseases of the *respiratory* organs are almost as fatal as the post-grippal diseases of the brain. The mortality from pneumonia seems to have varied between 50 and 80 per cent., and that of severe bronchitis (*not bronchial catarrh*) at different times has not been much less.

11. The remainder of the post-grippal affections give a tolerably good prognosis.

CHAPTER VII.

THE TREATMENT OF INFLUENZA.

I.—Prophylaxis.

1. *Quinine, Cod-liver Oil, and Salicine.*

The use of quinine has been much recommended as a protection against grip, no doubt because the disease was supposed to be of malarial origin. Since, however, the theory of the "air-borne miasma" has exploded, there does not appear to be any scientific reason why we should counsel the use of that drug, more especially as experience has proved it to be devoid of value. Graeser[479] has used quinine in the men of the second squadron of the King William I. Regiment of Prussian Hussars, stationed at Bonn, giving 7½ grains of it in whisky per diem. The result was, that although the number of cases was less in the second squadron than in the other four, where no quinine was given, yet cases did occur all the same in it after the use of the quinine had commenced. Tranjen[480] states that he succeeded by the administration of quinine in arresting the spread of grip in a battalion of infantry, in which after three or

four days of that treatment no fresh cases occurred; but it is, of course, quite possible that this might have happened had no quinine been given. In the same way it is stated that at the Birmingham prison this treatment had beneficial results; but there also the epidemic was already on the decline when the use of the drug was commenced. A case which speaks decisively against the efficacy of quinine as a prophylactic, however, is that of the military school at Glogau, in Prussia, where the cadets, on their return from the Christmas holidays, were systematically submitted to this treatment with the view of preventing an outbreak of grip. In that case the result was proved to be absolutely *nil*. Indeed, the military school was most severely visited by the epidemic, the number of cases occurring in the establishment being about double of that of the whole garrison of Glogau. Quinine cannot, therefore, be considered an efficient prophylactic of influenza.

Ollivier[481] has, in a communication to the French Academy, strongly recommended cod-liver oil as a preventive of grip. He says that the principal thing to do during an epidemic is to avoid catching cold, and this object can with certainty be attained by taking cod-liver oil. He gave it to thirty children during the epidemic of 1890, and none of them took the disease, while several of their brothers and sisters who did not take the oil became gripped. Adults and the aged

were also spared when taking this remedy, the dose being one or two dessert spoonfuls in the middle of the meal. Unfortunately it was stated at the next meeting of the Academy by Gautier[482] that Aussilloux, of Narbonne, found that in a hospital where nearly everybody was taking cod-liver oil at the time, 45 per cent. of the inmates nevertheless became gripped; and Le Roy de Méricourt observed, somewhat sarcastically, that Ollivier had not given his opinion about the mode of action of the oil. If it acted by the iodine it contained, one might just as well give iodide of potassium; but if it acted as fat, every other fat would do as well.

Maclagan,[483] who is able by means of salicin "to arrest the course of rheumatic fever in twenty-four hours," recommends the same medicine as a prophylactic for grip. "Personally he took during the last epidemic ten grains three times a day for many weeks. During one week he was so pressed by work that he forgot all about it and omitted it; at the end of the week he was down with the influenza." As influenza is now always with us, salicin ought, according to such a precept, be taken for years three times a day. Most people will think life too short for such a kind of prophylaxis.

2. *Re-vaccination.*

Goldschmidt[484] has recommended wholesale re-vaccination of the population with calf-lymph as a pro-

phylactic of grip. His attention was first drawn to the value of this proceeding by observing an epidemic of small-pox which broke out in Madeira in November, 1889. Two months afterwards influenza appeared in the island, the epidemic of it reaching its climax in February and March, 1889. Re-vaccination had at that time been extensively practised in Madeira, and it was noticed that those in whom the proceeding had been successful remained free from grip. In an isolated villa with twenty-six inhabitants, twelve persons, who had been re-vaccinated, escaped grippal infection, while the other fourteen who had not been re-vaccinated became gripped. On studying, in connection with this, the report of the German Ministry of War on influenza, Goldschmidt came to the conclusion that the prevalence and fatality of grip had been much lessened in the German army as compared with the civil population of Berlin, Paris, and the whole of Germany, by re-vaccination being systematically enforced in the army. Thus he found that grip affected 42 per cent. of the civil population of Berlin, and as much as 64 per cent. of that of Paris, while its prevalence in the German army amounted to 11·1 per cent. only. A number of garrisons were entirely spared, while the civil population of the towns where they were stationed suffered severely; and no garrison was ever affected where the civil population enjoyed immunity. Apart from this the

average duration of the illness was comparatively short in the army, viz., 5·65 days, while unfavourable complications occurred only in 3·1 per cent. of those affected. The death-rate was also smaller, being twelve times less than that of the civil population of Berlin, and twenty-five times less than that of Paris. He also found that amongst the troops those suffered severely who had not been recently re-vaccinated.

Goldschmidt's proposal, which I submitted to the profession in the first edition of this book, seems however to have fallen flat, as I have not heard of any trials on a large scale having been made with it, either here or in Germany. My individual experience of re-vaccination as a protective against grip is good, as I am in possession of a number of facts, showing that in the midst of a crowd of grip-stricken people, a small cluster of persons, who had for some particular reason been lately re-vaccinated, were not touched by the epidemic, although they mingled freely with those affected; while in some establishments every one was struck down except those children and adults who had been re-vaccinated a short time before.

At the same time the number of cases which I have been able to observe is far too limited to possess any decided value; while some of the facts brought forward by Goldschmidt in connection with this may be accounted for in a different manner. It is quite true that

some garrisons have been spared where the civil population was infected; but we have seen (p. 296) that in the case of the garrison of Parchim, to mention only one instance, this happened because it was quartered away from the town, and had no communication with its inhabitants. Moreover, recent researches seem to point to the conclusion that toxines and anti-toxines are highly specific, and that a certain toxine will only yield to its own anti-toxine and not to others, so that the value of re-vaccination as a prophylactic of grip would appear *primâ facie* to be doubtful.

3. *Isolation.*

Sisley[351] has strongly recommended to practise isolation in all cases, and to extend the provisions of the Infectious Diseases Act to influenza. Theoretically, no doubt, isolation would be a perfect prophylactic, but, seeing the immense number of persons who are habitually affected in an epidemic and also the comparative mildness of the symptoms in many sufferers, it would require Draconian severity to carry out such provisions, and might indeed paralyse the whole business and industry of the country for some months. The attempt to shut up thousands of men of business who have to earn their own and their families' living, simply because they have a slight attack of influenza, might lead to a

revolution, and would eventually tend to make the law ridiculous. Nevertheless Sisley's proposal may, in a much more limited manner, be of decided use, more especially in institutions, like schools, prisons, lunatic asylums and convents. The aged or infirm members of a family might also derive benefit from such a plan of action, although, seeing that grip can be sent by post, there must always be many chances of infection even when isolation is rigidly enforced. In the German army those surgeons who hold the contagionist doctrine have as far as possible practised isolation of those first infected; but it was soon found that the enormous numbers of men which had to be provided for, rendered isolation in most instances utterly impracticable. Nor was it always effectual when practised. In the second regiment of Grenadiers No. 101, at Dresden, and in the 9th Infantry Regiment No. 133, in Zwickau, grip spread amongst the men just the same, although all the first cases were most strictly isolated. Leeson,[485] however, has succeeded in keeping the Metropolitan and City Police Orphanage at Twickenham, with a population of 300 souls, quite free from grip, while this was raging all round, by enforcing a rigid system of isolation. The children were not allowed to go to church, the officers were entreated to keep within the walls and grounds of the building, all visiting was stopped both of parents and friends, and the "old boys' day" on Whit Monday

(when former pupils come from all parts to visit their old home) was suspended. Now although the disease did prevail all round the institution, even in the head-master's house, which is situated near the school, no case occurred amongst the inmates of the orphanage. This shows that for institutions with a limited number of inmates, isolation may be successful in preventing local epidemics.

4. *Disinfection* has found many prophets as a preventive of grip. Thus Cory[486] has a strong belief in the inhalation of two or three drops of carbolic acid, mixed with an equal quantity of glycerine, from a pocket-handkerchief before leaving the bedroom in the morning, and thinks that we may be able to stamp out an epidemic in a place by the free use of disinfectants, such as carbolate of creosote, carbolic acid, etc., sprinkled along the road-gutters and in the gully-holes of the public way, as long as the district sanitary authority may deem necessary! The prospect thus held out of getting rid of infectious diseases by such a cheap and easy method is indeed delightful. Cory is severe on Mivart[487] for confounding his pet preparation with the glycerinum acidi carbolici of the Pharmacopœia. Mivart, on the other hand, recommends spraying with cresolene for the same purpose, and states that where he thoroughly fumigated the house with this, no fresh cases occurred. Oil of Eucalyptus globulus has taken quite a hold of the

popular imagination, and has been used by gallons for the same purpose, no doubt with the view that it annihilates the "air-borne miasma." There is no reason whatever to believe that Eucalyptus oil is poisonous for Pfeiffer's bacillus.

With regard to disinfection as a prophylactic it seems to be forgotten by those who are so keen in its praises, that each bacillus has a different response to poisons, and that for its annihilation different chemical substances in varying degrees of strength are required. Now we are at the present time absolutely ignorant of the behaviour of Pfeiffer's bacillus with regard to antiseptics, and disinfection as a prophylactic can under these circumstances only be a matter of haphazard. Further research may lead to the discovery of special means by which this bacillus may be annihilated, and these will then no doubt become practically important. In the German army it has been noticed thus far that disinfection with carbolic acid, perchloride of mercury, etc., appeared sometimes to be useful, and at other times utterly useless. In many instances it was noticed that the epidemic disappeared much more rapidly from barracks and garrisons when no disinfection whatever had been practised than from others where this had been carried out to the fullest extent, and in a severe style.

On the other hand, it stands to reason that the excreta

of the patients, which may be supposed to be the carriers of infection, should be as far as possible removed and destroyed. This is more particularly the case with regard to the expectoration of those suffering from the catarrhal form of grip, as such sputa swarm with Pfeiffer's bacillus. The patients should, therefore, be induced to expectorate into glass vessels, which should be frequently emptied and disinfected in the ordinary manner. Pocket-handkerchiefs, soiled linen of any kind, and other objects which have been in contact with the patients, and which may therefore be considered carriers of infection, should likewise be rendered innocuous in the same manner which is employed in other contagious diseases by heat and chemical disinfectants.

5. *Hot air.*

Heissler[488] has found immunity to grip in those men occupied in glass-blowing works, who worked nearest to the furnace, while amongst those who were away from the furnace, 56 to 60 per cent. fell ill with it. He thinks that inhalation of the excessively hot air causes this immunity, the furnace having a temperature of 1,000° C. It would be difficult to expose the whole community to such a degree of heat, but the observation is valuable and may possibly at some future time be rendered practically useful.

6. *General Hygienic Measures.*

Although contagious diseases affect the strong and healthy as well as the feeble and infirm, yet certain general hygienic measures are no doubt often useful in warding off attacks. Temperate living and care in avoiding chills are more particularly important during an epidemic of influenza, as chills and excesses of various descriptions depress the nervous system and the phagocytic powers of the leucocytes, and thus facilitate the invasion of the system by Pfeiffer's bacillus.

The French Ministry of War[489] issued the following orders soon after grip had become epidemic :—

Drill in the open air is to be as short as possible, especially in the morning. The men are not to stand still, but to move about during the whole of that time. Where expedient drill is to take place in closed rooms. In cold weather the men are to have flannel underclothing and cloaks, and watch-duty is to be restricted. The sentries are to be relieved every hour, and to be provided with thick cloaks. If there should be an outbreak of the epidemic the men are to have tea and sugar twice a day, in addition to the ordinary diet. On account of the frequent abdominal complications of the epidemic, the men are to have flannel belts. In all barracks rooms shall be allotted for those whose cases are slight, and for convalescents, so as not to over-

crowd the hospitals, and such rooms shall be properly warmed, in order to avoid the prejudicial influence of cold on the respiratory organs. The surgeons are to give great attention to any cases of respiratory affections, however slight, more especially when occurring in men with morbid antecedents and who are not robust; and in any men of weak constitution the strict rules of service may be relaxed, if thought expedient.

The Surgeon-General of the German army advised the following measures to be taken during the epidemic: —No drill at all; the usual functions of roll-call and parade to be quickly finished; flannel belts and cloaks to be distributed amongst the men, to be worn when going out.

II.—Treatment of the Feverish Attack.

There are good grounds for believing that the experimental researches which have been lately made by Behring,[490] Kitasato, Wernicke,[491] and Klemperer,[492] on the cure of tetanus, diphtheria, pneumonia, and the septicæmia of mice, by the anti-toxines of these maladies, will, in course of time, lead to a similarly rational and successful treatment of the feverish attack of grip, and thereby prevent the occurrence of dangerous complications and sequels.

The time does indeed not seem far distant when we may expect "carbolised curative serums" of all infec-

tious maladies to be procurable and ready for use in the same way as we now have hypodermic tablets of the ordinary alkaloids at our disposal. Tizzoni and Cattani have now (April, 1892) cured four cases of traumatic tetanus with the injection of tetanus-antitoxine procured from dogs and rabbits; G. and F. Klemperer render rabbits proof against pneumonia, and Behring and Wernicke possess a sufficient quantity of anti-diphtheritic serum taken from sheep, with which to treat children suffering from diphtheria. Let us hope that a specific anti-grippo-toxine (p. 13) may soon be placed at the disposal of the practitioner, to be used in the very beginning of the feverish attack.

There is no reliable pharmaceutical specific for grip at the present time. Maclagan[483] and Turner[493] recommend salicin in twenty-grain doses—given at first every hour, and then somewhat less frequently—as such, and the results published by the latter are certainly striking; at the same time a far larger amount of evidence than has yet been given to the profession is required for making us accept salicin as a true specific.

Crerar[494] claims a similarly specific effect for bicarbonate of potash, of which he gives thirty grains in a teacupful of milk every two or three hours, adding digitalis and ammonia when the action of the heart becomes weakened. He claims for his method the following advantages:—

"1. If used before the attack it prevents the disease. 2. It destroys the power of the disease within twenty-four hours, generally within four or six hours. 3. The strength is conserved, and the convalescence is short and satisfactory. 4. Sequels are conspicuous by their absence. 5. The death-rate is reduced to a minimum. There has not been a single death in more than one thousand cases. 6. It has more power over influenza than any method of treatment over any other disease. 7. If adopted by the whole profession it would make influenza non-existent in one week. 8. It rests upon a sound scientific foundation."

Some of these conclusions are questionable, and others irrelevant, but the statements headed 2, 3, and 4 are worth considering.

Phenacetin, antipyrin, antifebrin, salicylate of sodium, salipyrin, carbolic acid, camphor, and chloride of ammonium, have likewise been recommended by many practitioners as specifics, and there is a general consensus of opinion that drugs of this class have a great influence in reducing the temperature and relieving the pain of the feverish attack. At the same time it must be stated that many patients have progressed equally rapidly towards convalescence when nothing but rest in bed, suitable food, and other general measures have been relied upon.

The dose of phenacetin is from five to ten grains

three times a day. Phenacetin is insoluble in water, and may be given in wafer papers, or in milk, or suspended with compound powder of tragacanth. Henry[495] and Clemow[496] speak highly of the effects of this drug. The latter considers it greatly superior to antipyrin and salicin, the pains being relieved more quickly, and there being no bad symptoms whatever as the result of the use of the drug. Aston[497] also considers phenacetin superior to antipyrin or antifebrin in its effects, more especially for sleeplessness.

Antipyrin has the great advantage of being freely soluble in water, and may be given in doses of fifteen to twenty grains, with an aromatic tincture, such as cardamom or orange-peel, every three hours until relief is obtained. As depressing effects have been seen by a number of practitioners from the use of this drug, it is useful to give tincture of digitalis or of nux vomica, together with it in those subject to cardiac weakness or general infirmity, and in the aged. It may also be usefully combined with quinine, dissolved in dilute hydrochloric acid.

Antifebrin dissolves in 190 parts of water, and in four of rectified spirit. It may be given in wafer paper, or milk, in doses varying from four to eight grains. The depressing effects of this drug, more especially in debilitated persons, seemed to be more marked than those of antipyrin and others of the same class, and as

there appears to be no corresponding advantage in its administration, antifebrin will probably only rarely be used for combating the feverish attack of grip.

Salicylate of sodium is easily soluble in water, and may be given in doses of ten to fifteen grains every three hours until relief is experienced.

Salipyrin, or salicylate of antipyrin, has been particularly recommended by Mosengeil[498] as an excellent remedy for the condition which we are now considering. It has the disadvantage of being nearly insoluble in water, but has no depressing effects, and is unquestionably a useful drug. The average dose is fifteen grains, which should at first be repeated every two hours, and afterwards at less frequent intervals. I have given it chiefly in protracted and alarming cases where antipyrin and phenacetin had already been administered, and where in spite of these remedies the fever, prostration, and somnolence were becoming aggravated. A decided change for the better was produced in these cases after a few doses of salipyrin, and the patients made good recoveries without being troubled by sequels.

Carbolic acid has been recommended by Simson.[499] He gives it in doses of two minims three times a day, and in severe cases more frequently, with a little compound tincture of cardamom and spiritus chloroformi.

Long[500] has strongly recommended camphor, the dose

given being 20 minims of the spirit of camphor every four hours, with tincture of lavender and spiritus chloroformi.

Marrotte[501] speaks highly of chloride of ammonium in doses of from 50 to 80 grains in the twenty-four hours, more especially in the catarrhal form of grip. He gives it in eight-grain powders in wafers.

Liquid food should be given about every three hours. A moderate amount of alcoholic stimulants is decidedly useful in most cases during the feverish attack. Dry champagne, and whisky with potash or Apollinaris water, are the most agreeable forms. The amount to be given must in each case be left to the judgment of the medical practitioner.

Where restlessness and insomnia add to the other troubles of the patient, Dover's powder (ten grains) or sulphonal (20 to 30 grs.) may be given about bedtime. Hot sponging of the affected parts often gives wonderful relief.

The management of the period of *convalescence from influenza* is of the very greatest importance, and often requires all the skill of the medical attendant to bring it to a successful close. The patients are generally eager to go out too soon, and must be prevented from injuring themselves in this way by every means in our power. We may often succeed in doing so by pointing to a subnormal temperature, which, as Vintras[502] and

others have shown, is so frequently present after the attack. The greater the weakness, the lower the mercury. It is often as low as 96°, and in this condition the patient is most liable to a chill, and to serious sequels. He should therefore not be allowed to expose himself to the vicissitudes of temperature, more especially in our changeable climate, before the temperature has been quite normal for a day or two.

Iron, quinine, and more especially strychnine, are most useful remedies for the depression of nervous force which is apt to follow the feverish attack.

III. Treatment of Complications and Sequels.

The principal rule for treatment in all these cases is that we should individualise as much as possible, and treat the patient rather than the disease. A supporting plan of treatment is, however, necessary throughout, seeing the depressant nature of the grippo-toxine which has been circulating in the system, and a nourishing and easily digestible diet, varied according to the requirements of each case, is therefore of the greatest importance. A moderate amount of alcoholic stimulants is useful in most cases where there is loss of appetite and a considerable degree of physical debility, in addition to any special complications and seque'ls. To this latter

rule there are but few exceptions, which will be mentioned hereafter.

1. *Mental Affections.*

Rest, avoidance of excitement, and change of air and scene are amongst our best restoratives, where the normal functions of the brain have been impaired.

In the first form of post-grippal mental affections, which comprises cases of neurasthenia, hypochrondriasis, and melancholia, loss of sleep is an important symptom, and should be combated by prolonged warm baths, and, if necessary, by the use of sulphonal and paraldehyde. Hydrate of chloral is in general not suitable for these cases on account of its depressing action on the heart; and this latter is habitually at a low ebb, showing signs of pneumogastric paresis, after the storm which has swept over the system. The action of sulphonal and paraldehyde should, however, be carefully watched, as in some cases untoward effects, such as ataxy of movement, and further obnubilation of the mental faculties, have been reported. If hydrate of chloral, which remains one of our most effectual hypnotics, should eventually appear necessary, fifteen or twenty minims of tincture of digitalis should be added to two drachms of the syrup of hydrate of chloral. If there is anorexia, bitter tonics and dainty dishes should be supplied; while for the general debility which is almost invariably present, quinine, strychnine,

and phosphorus have to be given, the latter either as phosphide of zinc, or as elixir phosphori. Where the pulse is rapid and feeble, digitalis or strophanthus come into play; and the action of the liver and the bowels must be carefully regulated, alteratives and aperients being given when required. Finally the tone of the nervous centres may be much improved by a judicious application of the constant galvanic current, applied more particularly to the præ-frontal lobes and the medulla oblongata, in doses of $\frac{1}{2}$ to 2 milliampères, for between five and ten minutes, either daily or every other day.

In the second group of post-grippal psychoses, which comprise chiefly the delirium of inanition or delirium of collapse, there is more immediate risk to life than in the first group, as the exhaustion is sometimes so extreme that the patients die with symptoms of cardiac failure. Where there is much excitement and delirium, hypodermic injections of morphine and atropine may be used with advantage, and should be followed by the exhibition of alcoholic stimulants according to the indications given by the pulse. Bromide of ammonium with digitalis and strychnia are likewise useful, and sleep must be procured by the means mentioned above.

The third class of mental affections which may occur after influenza are those grafted upon pre-existing neuroses or insanity, the attack of grip being only the

exciting cause of the mental trouble. These cases are of such a varied kind that no special rules of treatment can be given, for each case has to be treated on its own merits. In these as in other cases it is, however, always necessary to inquire about a previous syphilitic infection. Bremond (quoted by Bidon[111]) mentions the case of a stockbroker, aged 36, who had had syphilis sixteen years ago, and came from a neurotic stock; a sister and brother were lunatics, and another brother was an alcoholist and spendthrift. He had influenza with congestion of the lungs and hæmoptysis. During convalescence he was rather excited, and began to make absurd purchases of quantities of lavender gloves, silk stockings, carriages, etc., exchanged sixty francs for twelve, asserted that he was a count, and sent outrageous orders to the Stock Exchange. He was now certified, with the diagnosis of general paralysis, and submitted to specific treatment, when he at once became quiet and rational.

The fourth class of post-grippal affections consists of cases of general paralysis of the insane. In these cases a great deal may be done by early treatment with mercury and iodide of potassium, the smallest dose of the latter which is likely to do good being twenty grains three times a day. Alcoholic stimulants must be strictly forbidden, but the diet must be nourishing, and the general rules about avoidance of excitement, too early

return to business, etc., are here, if possible, even more important than in the former classes of cases.

2. *Post-Grippal Affections of the Brain and its Membranes.*

Most cases of this kind have such an extremely rapid course, and are attended with such profound alterations of structure, as to be insusceptible to treatment. In severe hyperæmia and multiple hæmorrhages we may, however, try the influence of hypodermic injections of ergotinine, and of blood-letting as suggested by Whiteley[503]: while in inflammation and cerebral abscess nothing can be done except relieving the sufferings of the patient. Where abscess of the brain, however, comes on after otitis media (p. 141), or where localising symptoms are very obvious, brain-surgery may step in, and achieve one of its rare triumphs.

Embolism and thrombosis of cerebral arteries are not so generally fatal as the other forms of disease which have just been mentioned. We have seen (p. 143) that of seven cases of apoplectic influenza two died, three recovered, and two others remained permanently disabled. Perchloride of mercury and iodide of potassium are the most useful drugs in these conditions.

3. *Diseases of the Spinal Cord and its Membranes.*

Acute ascending myelitis is generally a fatal disease, which kills by paralysing the bulb. Extensive vesication

of the spinal regions affected, together with purgation and large doses of iodide of potassium, may sometimes turn the scales in the patient's favour, as I have seen in cases of this affection arising from other causes than grip. In cases of rapidly ensuing spastic spinal paralysis, iodide of potassium should be given combined with arsenic. It is true that the patient whose case I have described on p. 151 did not recover under this treatment, yet he did improve while he was under the influence of it; and fromwhat I have since then seen in other cases, I believe that, provided the dose of the iodide is sufficiently pushed, satisfactory results may be obtained. In progressive locomotor ataxy and postero-lateral sclerosis, nitrate of silver, ergot, iodide of potassium, and electricity are the principal remedies at our disposal.

4. *Diseases of the Peripheral Nerves* require in general for a speedily effective treatment the use of both forms of electricity. If seen in the earlier stages, salicylate of sodium in fifteen-grain doses is also useful. In pneumogastric paresis, tachycardia, angina pectoris, etc., electricity is the best curative agent, but digitalis, strophanthus, nitrite of amyl, nitroglycerine, etc., may be administered along with it.

5. *Affections of the Sympathetic System* of nerves after grip have to be treated according to the nature of each individual case. In swelling of the thyroid body, iodine

has to be used externally and internally; in migraine we may use ergot and the various analgesics, more especially phenacetin and exalgine, while in congestive headache iodide of potassium again forms our sheet-anchor. For scintillating scotoma (p. 199) I have found a combination of quinine (five grains) and antipyrin (fifteen grains), twice a day, invaluable. In Graves's or Basedow's disease the continuous current, frequently administered, is the best remedy.

6. *The General Neuroses* which occur after grip have to be treated in the same way as we are in the habit of treating them when owing to other causes. Thus in *epilepsy* the bromides will step in, combined with other drugs according to any special indications which may be present. In *tetanus* we should, if possible, resort to hypodermic injections of anti-toxine of tetanus (p. 12 and 345), while in *hystero-epilepsy* and *hysteria* a total change in the conditions of life is generally requisite. *Catalepsy* and *trance*, if at all prolonged, should be treated with the maximum power of a good induction apparatus, the current being applied with a large wire-brush, whereby the duration of such attacks is wonderfully shortened. In *chorea*, a combination of arsenic and antipyrin is valuable. In *agoraphobia* a stimulating and tonic plan of treatment has to be carried on for many months before the patient may be considered as fairly re-established.

7. The treatment which has been adopted by the

most competent ophthalmic surgeons for *diseases of the eyes*, seen with or after influenza, has already been mentioned (p. 128), so that I need say nothing more about it in this place.

8. *Diseases of the Ear* after grip have to be treated according to the same principles which guide the conduct of the aural surgeon in ear-diseases from other causes. It is mentioned in the Report on Influenza in the German Army that covering the ears with cotton wool, and spraying of the cavity of the nose and of the fauces three times a day with warm water, gave great relief. Cold compresses, gargles of chlorate of potash, careful Politzerising and daily ablution of the external meatus with a tepid solution of carbolic acid, were also useful. In otitis media, injections of warm water, or a solution of sulphate of zinc, and insufflation of boracic acid, were beneficial. Sometimes leeches were applied; the membrane had to be occasionally incised, and the mastoid process opened.

9. *Diseases of the Organs of Circulation* have to be treated according to general rules; on the whole, however, a more tonic and stimulating plan has to be pursued in the grippal variety than where these diseases are owing to other causes. A single dose of digitaline dissolved in water (gr. $\frac{1}{120}$th to $\frac{1}{60}$th) is sometimes more efficient than repeated small doses of the tincture of digitalis.

10. *Diseases of the Respiratory Organs.*

Laryngitis requires chiefly local treatment, according to the individual aspect of the case. In bronchitis steam inhalations, to be continued for fifteen or twenty minutes at a time, are of importance, as of terebene, ichthyol (Lorenz), in a two per cent. solution, menthol (Lennox Browne), in a ten or twenty per cent. solution, and others. Carbonate of ammonia with ammonium chloride should be given internally. Compound tincture of camphor, cannabis indica, liquor morphiæ, and sub cutaneous injections of morphine must be given where the cough is exhausting, and does not yield to other treatment. Inhalations of chloroform, more especially with Krohne's inhaler, which allows of minimal quantities being inhaled without waste or risk, are likewise often of great assistance in these cases.

Broncho-pneumonia is one of the most terrible complications of influenza. Brunton and Prickett[504] recommend hypodermic injections of strychnia, and inhalation of oxygen; and Collier and Symonds[505] report a case of severe broncho-pneumonia which appears to have been successfully treated by continuous inhalations of oxygen. In that case the patient's condition had grown steadily worse, and was highly critical when oxygen was first used, as she was then semi-conscious, cyanosed, had fifty inspirations, a pulse of 120, and the urine contained

albumen. After the inhalation of oxygen there was unmistakable improvement in the rate of respiration and pulsation, and otherwise; the cough was lessened, and the lung mischief was gradually clearing up at the time the case was reported. Cooper Cripps[506] reports a case in which the hypodermic injection of $\frac{1}{50}$th grain of strychnine seemed to turn the scale in favour of the dying patient, and after $\frac{1}{10}$th grain had been given, respiration had become quite regular, and consciousness had returned. The patient subsequently made a complete recovery. Gordon,[507] on the other hand, recommends the external application of cold, even where there is no hyperpyrexia, by sponging first with tepid water, which is then gradually cooled down with ice, in order to counteract the depressing influence of a steady temperature of 103° or 104°. Huchard,[508] again, thinks it important to begin the treatment with digitalis, or rather the use of crystallised digitaline, of which he gives a single dose, amounting to about as much as $\frac{1}{20}$th grain, in the day. One part of digitaline is dissolved in a thousand parts of water, and forty to fifty drops of this solution are given. He considers a single large dose better than small doses repeated at short intervals. The only food allowed is milk. The day after the dose of digitaline has been administered he advises to give no medicine, unless there is failure of the heart's power, for which hypodermic injections of ether, caffeine, or cam-

phor or strychnine, should be given, according to circumstances, two, three, or four times a day. The digitaline may be repeated, if necessary, in seven or eight days, in a somewhat smaller dose, viz., twenty or thirty minims of the solution mentioned above. For rendering the mouth aseptic, which he thinks necessary in order to prevent secondary infection of the air-passages, he employs a solution of perchloride of mercury or oxygen-water as a wash; and for keeping the intestinal canal free from noxious bacteria, he prescribes capsules of benzo-naphthol, four or five times a day. He also advises the use of one to two drachms of tincture of kola and tincture of coca daily.

No special rules need be given for the treatment of diseases of the *digestive*, *urinary*, and *sexual* organs, or of the affections of the *skin* and *joints* which may occur after grip. The chief object must be to maintain the powers of the patient, which are almost invariably at a low ebb, and to relieve pressing local symptoms by appropriate treatment.

POSTSCRIPT

TO PAGE 83.

WHILE these sheets were passing through the press, I was asking for information, through the columns of the *Lancet*, for post-mortem evidence showing the particular lesion which I had predicted to affect the bulb during the feverish attack of influenza. A number of letters appeared in reply to mine, some of them irrelevant and not to the point; but in the *Lancet* for March 12, 1892, Dr. MacDonald, of the Dorset County Asylum, wrote to say that in the only case in which he had had the opportunity of examining the brain of a patient dying from influenza, he had found the exact post-mortem appearances which I had predicted. He says: "In that case the pia mater was thickened and excessively congested; there was an excess of sub-arachnoid fluid, and a more or less general cortical hyperæmia. *But the most remarkable pathological appearance was the intense congestion, almost amounting to capillary hæmorrhage of the medulla.* This condition of

the bulb Dr. Goodall does not seem to have met with, which is all the more remarkable when the apparently trustworthy records published by Dr. Althaus are read in conjunction with the facts here stated. The case forming the subject of these notes died from broncho-pneumonia, after an illness of five days. In addition to a high temperature and general prostration, the most noteworthy clinical fact was persistent vomiting."

Dr. MacDonald has since then given me the following particulars of this case: The patient, aged 29, a general paralytic, had a typical attack of influenza, with high temperature, prostration, and vomiting, and the duration of the final illness was five days. The autopsy, made sixteen hours after death, showed the dura mater slightly thickened, and the pia mater very much thickened, and excessively congested. The venous sinuses were distended with fluid blood. There was thickening and engorgement of the vessels, especially at the base. There was excess of arachnoid fluid. The cortex of the brain was pinkish, and generally in a state of hyperæmia. A few surface ulcers were seen in the motor regions. On section the cerebrum was soft and wanting in consistence. The central ganglia showed no special lesion. The membranes surrounding the medulla oblongata, especially the ependyma on the floor of the ventricle, were more highly hyperæmic than elsewhere; and the bulb itself was not only congested, but the vessels

ERRATUM.

On p. 145, line 9 from top, *read* "left" *instead* of "right."

seemed full to bursting. On section it was observed that this intense hyperæmia of the medulla was greatest, or most noticeable, immediately under the floor of the fourth ventricle. In the centre of the bulb the arterial congestion showed itself in irregular and tortuous areas, suggestive of following the outline of the divisions, nuclei, etc. No naked eye softening of the bulb. Pons congested. With the exception of the lungs, which showed typical broncho-pneumonia, the other organs were fairly healthy.

THE END.

LITERARY REFERENCES.

ABBREVIATIONS EXPLAINED.

Allg. M. C. Z. .	Allgemeine Medicinische Central-Zeitung.
Allg. Z. f. Psych.	Allgemeine Zeitschrift für Psychiatrie.
Ann. d'Hyg. . .	Annales d'Hygiène Publique.
Ann. d'Or. . .	Annales des Maladies de l'Oreille.
Arch. Méd. Pharm. . . .	Archives de Médecine et de Pharmacie Militaires.
Arch. Gén. de Méd.	Archives Générales de Médecine.
Ann. Méd. Psych.	Annales Médico-Psychologiques.
Arch. Ohr. . .	Archiv für Ohrenheilkunde.
Be. Kl. Wo. . .	Berliner Klinische Wochenschrift.
Boston M. and S. J.	Boston Medical and Surgical Journal.
B. M. J. . . .	British Medical Journal.
Bull. de l'Ac. . .	Bulletin de l'Académie de Médecine.
Bull. de Thér. .	Bulletin de Thérapeutique.
Bull. Biol. . . .	Bulletin de la Société de Biologie.
C. B. für Gyn. .	Central-Blatt für Gynækologie.
C. B. für Kl. M. .	Central-Blatt für Klinische Medicin.
C. B. für N. H. .	Central-Blatt für Nerven-Heilkunde.
C. B. für Aug. .	Central-Blatt für practische Augen-Heilkunde.
C. B. für Bac. und Par.	Correspondenz-Blatt für Bacteriologie und Parasitenkunde.
C. B. Schw. . .	Correspondenz-Blatt für Schweizer Aerzte.
De. Me. Wo. . .	Deutsche Medicinische Wochenschrift.

Dubl. M. J. . . Dublin Medical Journal.
Edin. M. J. . . Edinburgh Medical Journal.
Gaz. Hôp. . . . Gazette des Hôpitaux.
Glasg. M. J. . . Glasgow Medical Journal.
Gaz. Heb. . . . Gazette Hebdomadaire de Médecine et de Chirurgie.
Gaz. Méd. de P. Gazette Médicale de Paris.
Int. Kl. R. . . Internationale Klinische Rundschau.
Jahr. f. Kinder . Jahrbuch für Kinderheilkunde.
Lyon M. . . . Lyon Médical.
Me. Mé. . . . Mercredi Médical.
Me. P. and Circ. Medical Press and Circular.
Mitth. Pf. Aerzte. Mittheilungen des Vereins für Pfälzer Aerzte.
Mitth. Stey. . . Mittheilungen des Vereins der Aerzte in Steyermark.
Med. Würt. . . Medicinisches Correspondenzblatt des Würtembergischen ärztlichen Landes-Vereins.
Mon. Dermatol. . Monatshefte für praktische Dermatologie.
Montp. Med. . . Montpellier Médical.
Mü. Me. Wo. . . Münchener Medicinische Wochenschrift.
Neur. Cent. . . Neurologisches Centralblatt.
New York M. R. New York Medical Record.
New York M. J. New York Medical Journal.
Pract. . . . . The Practitioner.
Pra. Me. Wo. . Prager Medicinische Wochenschrift.
Pro. Méd. . . . Progrès Médical.
Rec. d'Oph. . . Recueil d'Ophthalmologie.
Rev. Cl. Thér. . Revue Générale de Clinique et de Thérapie.
Rev. Enf. . . . Revue Mensuelle des Maladies de l'Enfance.
Rev. Méd. . . Revue de Médecine.
Rev. Suisse N. . Revue Médicale de la Suisse romande.
Rif. Med. . . . Riforma Medica.
Schm. Jahrb. . . Schmidt's Jahrbücher für die gesammte Medicin.

Sem. Méd. . . Semaine Médicale.
Pet. Me. Wo. . St. Petersburger Medicinische Wochenschrift.
Ther. Mon. . . Therapeutische Monatshefte.
Trib. M. . . . La Tribune Médicale.
Volkmann . . . Volkmann's Sammlung klinischer Vorträge.
Verein. Pfälz. . Vereinsblatt der Prälzer Aerzte.
Wi. Kl. Wo. . . Wiener Klinische Wochenschrift.
Wi. Me. Bl. . . Wiener Medicinische Blätter.
Wi. Me. Wo. . Wiener Medicinische Wochenschrift.
Wi. Me. Pr. . . Wiener Medicinische Presse.
Zehender . . . Zehender's Klinische Monatsblätter für Augen-Heilkunde.
Z. f. Kl. Med. . Zeitschrift für Klinische Medicin.

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