

T H E S I S

o n

I N F L U E N Z A

For the Degree of

DOCTOR OF MEDICINE OF THE UNIVERSITY OF GLASGOW

b y

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January, 1905.

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I N F L U E N Z A.

PROLOGUE.

I have chosen the subject of "Influenza" as a subject of Thesis chiefly because a survey of the cases I have attended during the last decade has considerably impressed me with the ready way in which the disease seems to obtrude itself upon the attention of the profession and laity alike, and that too during a period perhaps in which the malady has not assumed epidemic proportions, nor exerted its potency for evil to anything like the extent to which all are now more or less by personal experience familiar. I think the subject of Influenza an important and practical one; as during epidemic interludes the disease seems to remain to a great extent endemic, in certain localities, for a considerable length of time: it may be questioned, moreover, whether any district ever really becomes free from it: sporadic cases are of frequent finding. It is, I believe, the experience of every member of our profession that they have had to deal with a considerable number of presumably influenzal cases each year, in which the symptoms are so suggestive, and the prostration so profound that the diagnosis of influenza is made without any hesitation; and doubtless the diagnosis in the vast majority of these instances has been justified by events, and often perhaps confirmed bacteriologically.

Again, the writer still remembers how when engaged at the clinics of the Glasgow Western Infirmary, 1889-1890, and epidemic of influenza was then raging, and how most of the students of the time were themselves attacked by the malady, and its virulent nature thereby somewhat forcibly impressed upon them - the writer included.

A further personal experience at that time may be related by way of demonstrating the epidemic prevalence of influenza - viz., how on the writer's seeking a brief respite from study in a northern Irish hamlet, he observed the disease to have afflicted all and sundry and to have spread consternation all around the neighbourhood. A wave of depression seemed to have come over the whole locality, for if there was not one dead in every house, there certainly seemed to be one ill; and in many instances the entire family happened to be bedridden. The epidemic of that winter was most indiscriminate in its selections; male and female, old and young, rich and poor, seemed to be attacked with equal readiness. Young children, however, were not quite so liable to contract the infection as adults, but they certainly did not escape from its ravages.

Townsend, of Boston, has recorded a case where the mother had an attack about the time of her confinement, ~~and one~~ in which the child a few hours after birth exhibited all the symptoms of the disease.

My own experience has been that children, whilst frequently attacked, usually recover readily enough. Examination of my case book also shows that males are somewhat more susceptible to influenza than females, roughly, in the proportion of 2 : 3, and this I attribute to the former moving about along the lines of human intercourse more freely than the latter; their greater exposure to the vicissitudes of the weather; the debilitations of occupation lowering their vital resistance and causing them to fall an easy prey to the infection, should they

come in contact with it.

During the time of the epidemic mentioned, the subject of influenza was very freely discussed in both medical and lay journals. From time to time new opinions - many of them of a more or less ridiculous nature - were vaunted as to its causation. Even the electrical machines at the Paris Exhibition were suspected of having formed allotropic oxygen thereby causing a peculiar atmospheric condition, to some extent believed to be etiologic. Many other theories, much more absurd, were from time to time announced, and with apparent sincerity, as is evidenced by the literature of the period in question. New remedies and so-called "specifics" were, as might be expected, enthusiastically recommended, and with dismaying rapidity of sequence, by the orthodox and the empiric alike. Those were turbulent times indeed! Perhaps many of our number amidst the confusion and excitement and the overwork then experienced did not preserve inviolate their customary professional equilibrium, with the consequences alluded to. Since then, however, we have had time to settle down to reflective rest and at leisure to digest the facts then acquired, surveying the same coolly and dispassionately and deducting therefrom many salutary lessons.

One ought to consider now: (a) Are our ideas about influenza clearer and more scientific today than formerly, and do we really know more of its causation and the laws presumably governing its propagation? (b) Are we better prepared to face another epidemic should it come this year or next, and could we check more surely the advances of the dreaded scourge by methods now available? (c) Can we mitigate the suffering of the afflicted ones better, and prevent the occurrence of the dreaded complications? (d) Can we reduce the mortality to any appreciable degree? For, though the mortality of influenza, generally speaking is not high, especially when the number of persons attacked is taken into consideration, yet the effect of the last epidemic upon the death-rate was both sudden and pronounced, and has made us alive to the advisability of being able to early recognize influenza, to treat its sequelae as well as to anticipate their occurrence, and to deal with the disease as drastically as possible in view of its serious and far-reaching effects.

DEFINITION.

Influenza is an acute infectious epidemic - frequently endemic or even pandemic - disorder due to Pfeiffer's bacillus, whose chief symptoms are occasioned by catarrh of the respiratory and digestive tracts, together with profound muscular and nervous prostration and grave complications, more especially that of pneumonia.

NOMENCLATURE.

Influenza, like a great many other maladies, has been unfortunate in its synonyms. Its names for ages past have been legion. Amongst the cognomens which occur to the writer are the following:

Catarrhus e contagio (Cullen).

- Tuss's Epidemic (Sydenham).
- Epidemic Catarrh.
- La Grippe (French).
- Grippe (German).
- Chinese Fever.
- Russian Cold.
- Epidemic Catarrhal Fever.
- Russian Influenza.
- Centro-neural Fever.
- Feverish Cold.
- Nursery Fever.
- Sweating Sickness (?).

This list, however, is by no means exhaustive, and from time to time one comes across an almost illimitable number of designations in the literature of all nations.

It may be as well, for the present at least, to confine ourselves to the familiar one of influenza; but, before leaving the subject of nosology, it may be noted that until some more definite and established system of nomenclature is introduced into the classification of disease, based upon bacteriological findings, the odious custom will remain of naming diseases either according to their clinical aspects or anatomic changes. Now, a disease so variable and changing in its manifestations as influenza undoubtedly exhibits but little constancy as to the organs attacked by the *materia morbi*.

The difficulty experienced in finding a suitable and comprehensive designation is apparently even now as unsurmountable as hitherto. Even if we adopted a title with as many letters as some of the synthetic medicaments which from time to time emanate from German and American laboratories, the similarly unsatisfactory state of the nomenclature would still exist. Attempts in this direction have been made by synonyms such as the following : -

- Catarrhus Epidemica.
- Catarrhus Febrilis.
- Febris Catarrhus e Contagio.
- Febris Catarrhosa.

Anatomic findings have also been utilized to the same end, but with no more satisfactory results, as the post-mortem lesions of influenza are by no means either distinctive or peculiar.

#### Origin of the Term Influenza, and Defects in Usage.-

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The term "Influenza" is of Italian origin, and was first used so far back as the year 1580 by Pietro Buonsegni: it literally means an "influence", the disease being then supposed to be due to the "influence of the stars." The designation is, therefore, somewhat questionable, but has the virtue of antiquity and establishment in its favour, as well as that of being universally known and adopted. It is, however, vague in the extreme, which, paradoxical as it may seem, is not altogether undesirable, in the sense that it does not bind the user down to the errors of any imperfect or fallacious observations; and, still further, does not unduly accentuate any particular aspect

of the disease.

## H I S T O R Y.

The history of influenza can be traced very far back into the dim and uncertain past. Records of epidemics are to be found in the literature from the earliest times.

The first epidemic of which we have a full and accurate description is that which seems to have occurred in the year 1510.

In Dr. Short's History of the Epidemics of 1510 - 1518, we have a very complete word-picture of a case of acute influenza, which is of more than passing interest in that it demonstrates what keen and painstaking clinicians our forefathers in medicine were; and no apology is, therefore, needed for the somewhat liberal degree to which the writer has drawn upon it.

We read in the Annals of Influenza (New Sydenham Society, 1869) that in sundry places it began with weariness and heaviness and painful sensations; heat and shivers seized the whole body chiefly the breast and head, with dry cough and roughness of the jaws, difficulty of breathing, weakness and langour of the stomach, green bile like the juice of leeks, which symptoms increased with the disease, as the fever, cough, weight, and pain of the head, itching, dryness, and roughness of the tongue, and shortness of breath. At the height of the disease all these were heightened, and accompanied with catarrh, cough, and spitting. Some had swelling of the glands of the throat. In some it went off by stool, in others by urine or stool or sweat or bleeding at the nose. Some had spots: in some it ended in pleurisy and pneumonia.

Now it may be questioned if many of us could now-a-days furnish any more satisfactory description. Of course there is no attempt made to differentiate between the different types of influenza, but most of the typical symptoms are well and truthfully recorded. The sudden onset, the langour, the wakefulness, the headache, and general muscular uneasiness, are all noted: even the rash which sometimes occurs has not been omitted.

The exact origin of the disease is also mysterious and far from being apparent. The early Jewish writers called it "Kurdarhur" because they supposed it to have come from the Kurds. The Russians called it "Chinese Fever" as one epidemic which travelled westward was supposed to have been caused by a serious inundation which occurred in Manchuria. The Germans and Italians call it "Russian Fever." In regard to this Lesser gives a rather revolting description of Russian peasant life, revelling in sordiness, exceeding any of the dark pictures which Gorky and Tolstoy have drawn for us with such microscopic realism. If any of these descriptions of Russian peasant life are true, their homesteads seem certainly to be suitable habitats, or natal places for any kind of germ life.

Atmospheric conditions, celestial bodies, volcanic eruptions, etc., have all at different times been mentioned as supposed causative agents. Insects, and other supposed etiologic agents are scarce worthy of serious consideration.

With regard to volcanic dust, it occurs to the writer that it ought to be entirely sterile coming as it does from such a fearful heat as the central basin of an active volcano affords, and that the worst it could do would perhaps be to cause a certain amount of bronchitis from direct mechanical irritation. Speaking of this, E. Symes, in 1890, made the rather ingenious suggestion that Chinese dust or meteoric particles might supply the raft for the conveyance of the micro-organism of the disease.

In spite of much investigation, however, the propagation of influenza remained in a state of obscurity for a long time. Tessier, writing as late as 1890, in the Bulletin Medical, stated in very beautiful and poetical, if not very satisfactory, language to the effect that in regard to the unknown origin of the disease, influenza is without cradle of origin, born no one knows where, passes like a cloud which obeys the caprice of the night, traversing at the same time, or in the course of a few days, the distance between towns situated at the four corners of the earth.

The miasma-theory was first promulgated by the Hon. Rollo Russell, and it, with the miasmatic-contagion-theory continued to be held in high respect until comparatively recently.

The writer, during the course of studying some of the older ideas as to the causation of influenza, has been impressed by the peculiar fact that each country seems to have given an eastward origin from its own geographical position to the disease.

#### B A C T E R I O L O G Y .

Although the nature of the organism of influenza had been worked at constantly and insiduously, by such good observers as Finkler, Krause, and Pansini - to mention only a few, their conclusions were always either contradictory or uncertain. It was not until the year 1892 that a clear definite note was sounded.

In January of the above mentioned year, the first satisfactory account of the influenza bacillus was published simultaneously by Pfeiffer, Kitasato, and Canon. These observers, working independently, seem to have arrived at almost similar conclusions. It is ~~always~~ <sup>how often</sup> strange, ~~that~~ that phenomenon is to be noted in the history of medicine, e.g., different scientists working quite separately, by some mysterious fatality cause their discoveries to be given to the world either at the same time, or within a few days of each other, the results and conclusions of years of laborious scientific enquiry.

Here then we have recorded a decided advance in our knowledge, in that it was found that influenza is due to a recognised specific micro-organism. Vague theories had, therefore, to give place to established facts.

But perhaps all the older causations ought not yet to be passed by too lightly and be set aside as utterly fallacious. The writer does not, however, intend by this statement to imply that scientists now-a-days would regard any of them as being the actual exciting cause of influenza; still, he is of the opinion that some of them may be at least to a certain degree etiologic. May not atmospheric

conditions, and the like, in some mysterious way influence the growth, spread, and virulence of microbes, as well as have some effect upon the susceptibility of human beings? One should suspend on this point until our knowledge of microbial life outside the human body is somewhat more perfected. For the present it may be said that, with the exception of the micro-organisms of malaria, and to a lesser degree the bacillus of typhoid fever, we know scarcely anything. The influence of environment on microbial life is likewise a problem that has never yet been satisfactorily unravelled.

Perhaps it may be as well now to consider, firstly, the morphology of the influenza bacillus; secondly, to note briefly its behaviour under cultivation; and thirdly, how it comes to be regarded as specific from the experiments of its discoverers.

#### Morphology of the Bacillus.-

The Bacillus Influenzae occurs in very minute rods, which frequently arrange themselves in chains. These rods are only half as long as the bacillus of mouse septicaemia, but of the same diameter - 1.5 mm. in length and 3 mm. in breadth. They are devoid of capsules; thus they can hardly be mistaken for Frankel's diplobacilli. They are aerobic, without movement, and do not take the Gram stain.

#### Attempts at Cultivation.-

Pfeiffer first obtained the bacillus from the bronchial secretions. He experienced, however, great difficulty in obtaining pure cultures, and did not succeed in carrying the culture beyond the second generation. This he attributed to the contamination of other microbes which are habitually to be found in the mouth: these grow so much more luxuriantly in nutrient media that the influenza bacilli are quite obscured by them.

It has since been observed by the late Professor Coates, in his well-known work on Pathology, that the finer cultures are found far down the bronchial tubes, in many cases after death; pure cultures have been found in the finer bronchi and lung alveoli.

#### Animal Experiments.-

Pfeiffer found animals to be very refractory, but he claims to have produced a feverish condition, somewhat resembling influenza, by inoculating monkeys and rabbits.

Cantani also succeeded in producing infection by injecting bacilli into the anterior portion of the brain of rabbits, an encephalitic condition being induced. In these experiments the infectious material produced lesions which spread to the ventricles and thence to the spinal cord, but the bacilli were never found in the blood, or other organs.

Pfeiffer and Cantani both agree in thinking that the fever and other symptoms which occur in the susceptible after inoculations may be due to toxins resident in the bodies of the bacilli. The last mentioned observer found that he could produce similar symptoms by the injection of dead cultures, although it required five or six times as large a dose.



Kitasato was able to effect cultivation to the tenth degree or generation. He adopted what was practically Koch's method for the securing pure cultures of the tubercle bacillus from the sputum of a tuberculous patient. By repeated washings he got rid of the other bacteria which had proved so confusing in Pfeiffer's experiments. He also <sup>noted</sup> that cultures of the influenza organism, in suitable media, have the peculiarity of always remaining separate from each other, as small points of a watery-like appearance which never join together to form continuous rows, but all other bacteria do so: this peculiarity is so striking as to be regarded as pathognomonic.

Canon claims to have been able to obtain pure cultures from the blood, but states that very few rodlets are to be found, and that cultures obtained from these have the same appearance as those described by Kitasato. The cultures were repeatedly injected into mice, but with negative results. It has not yet been proved that the bacilli propagate to any considerable extent in the blood.

Klein was able to isolate the bacilli from the blood on only six occasions, failing to do so in thirty-seven occasions.

The Bacillus in the Blood-stream.

The free circulation of the influenza bacilli in the blood has not yet been satisfactorily established. After a careful study of the various experiments, the writer has come to the conclusion that the safest view to take at the present time is that the bacilli find habitat chiefly in the respiratory tract and other places congenial to their growth; here the toxins are produced, and, entering the circulation, produce the characteristic symptoms, showing likewise a certain selective tendency for nerve cells and fibres, thereby resembling other intoxications, as diphtheria.

Babes (eber die bei Infl. gefund. einen Bakter., Deut. med. Woch., Feb. 11, 1892) was, however, inclined to doubt the accepted opinion of Pfeiffer's bacillus being the sole cause of influenza, believing rather that some of the other bacilli present in the sputum and pulmonary secretions admit of etiologic interpretation. Nevertheless, authorities are now agreed that influenza is propagated by means of the bacillus-bearing expectoration, disinfection of which may be expected, with practical certainty to entirely eradicate the contagion

Koch lays down four rules or postulates with which a microbe must comply before it can be said to be the cause of any disease: (1) It must be found in the tissues or secretions of the persons or animal affected. (2) It must be capable of being cultivated outside the body on an artificial medium. (3) A culture so obtained must produce the disease in question when it is introduced into the body of a healthy animal. (4) The same germ must then again be found in the animal so inoculated.

The writer believes that he has clearly convinced himself that the influenza bacillus fulfils the first three conditions. The fourth point is the only weak link in the chain of evidence, and has never yet been satisfactorily placed on an equal footing with the other three.

### Vital Resistance of the Bacillus.

The above mentioned defect in evidence is probably due to the fact that the animals experimented upon have not been sufficiently susceptible; also to the fact that the vitality of the bacillus outside the human body is very low, and this, still further, increases the difficulty of laboratory experimentation.

The bacillus is killed by extremes of temperature: its maximum temperature being 42°C., and its minimum 25°C. It will not live more than two days in the dry state or in water; in moist sputum its vitality is preserved only for two weeks. It thrives best at the normal temperature of the human body; and, moreover, in the presence of blood and haemoglobin.

It is the writer's firm belief that if anyone were enthusiastic enough in the cause of science to come forward and submit himself to experimental inoculation, this point would be satisfactorily settled. So far, however, for all that one knows to the contrary, the unpleasantness of a disease which has truthfully been termed "misery fever" has as yet proved an effectual deterrent to such a procedure.

### E T I O L O G Y.

Influenza is, therefore an infectious disease; it is due to the invasion and reproduction within the body of the specific micro-organism of Pfeiffer; this always develops from pre-existing organisms and never arises de novo. Here, as in regard to all other bacteria, the truth holds good, as Pasteur long ago demonstrated, that like reproduced like. Pfeiffer's bacillus is present in every case of the disease.

A person to develop influenza must in some way or other come into contact with the specific bacillus. Hence, it follows that the disease is spread by c o n t a g i o n, and that only. It usually occurs from person to person, mostly by the moist sputum or bronchial secretion in which the bacilli are most abundantly found and retain their vitality longest; perhaps also fomites may transmit the infection. This should certainly be considered, especially in cases with well-marked abdominal symptoms.

#### Propagation of the Infection.

That influenza follows the lines of human intercourse was sufficiently proved during the last epidemic; and the writer can mention numerous instances of how people who lived very sequestered and isolated lives - such as the inhabitants of convents and prisons - have escaped the infection. A particular instances may here be cited (Sisley's Epidemic Influenza), and was that of the Charlottenbourg Nuns. Here we have a large community living the ideal life, so far as isolation is concerned; for their rule is strict, and they have no communication with the outer world, except indirectly through other women. Yet, during the winter 1889-90, when influenza was raging in the city around them, not a single case occurred in the convent, although the inmates numbered 100 or more, and several of them were suffering from pulmonary complaints.

It is true today in regard to influenza what was so quaintly pointed out by Dr. Hoggarth of Chester, over one hundred years ago that "disease advances not at the rate of the wind, but only as fast as the coach can go". Why it should spread faster now is apparent. Why in epidemic times influenza should advance with such fearful rapidity can be accounted for by the shortness of the period of incubation (2 to 6 days, as a rule), and by the great number of susceptible individuals in every community, at all times, as the immunity conferred by a previous attack is of a very transient character. The writer does not intend to admit that one attack predisposes to another, but believes that there is a certain degree of immunity conferred. Besides, in the past our methods of isolation have not been at all thorough or careful. People with slight attacks have been allowed to wander about at will, probably in this way spreading the disease broadcast.

But that the disease is not an air-borne infection appears tolerably certain, especially when we consider the low vitality and short life-expectation of the microbe outside the human body. Any multiplication in air or in water cannot be great: also, its presence in the air from dried sputum can only occur to a very limited extent, for, as has been shown above, it will not live more than two days, either in the dry state or in the moist condition.

#### Comparison with Pneumonia.-

It may serve a useful purpose at this juncture to contrast influenza with pneumonia, not only because there is an interesting and striking analogy between the two diseases, but chiefly <sup>because</sup> there seems to have been more experimental work done in regard to pneumonia as far as obtaining an antitoxine is concerned.

Any substance to be considered an antitoxine must, in the first place antagonize the injurious influences of micro-organisms when they have entered the human body and thus bring about recovery; and, secondly, protective injections of the substance must so immunize a person that he becomes insusceptible to the micro-organism. When one discovers such an agent in regard to any specific disease, idealism in therapy may well be considered to have been achieved. Why pneumonia should be more evolved in this respect than influenza seems to be due to the fact that most animals appear to be more susceptible to pneumonia, whereas they are most refractory to influenza.

Influenza and pneumonia resemble each other as regards the following particulars: The writer has frequently been impressed by the similarity of clinical course run by the two diseases. The very same fact has been studied by numerous clinicians, notably by G. and F. Klemperer (Verusch. über Immun. und Heil. bei der Pneumococcus Infection - Berl.klin.Woch., Aug. 31, 1891), who came to the conclusion that the severity of the attack was ~~due~~ due to the potency of the toxine secreted by the bacilli, not to the number of the latter present in the patient's system. The Klemperers were each able to obtain the pneumotoxine as a pale yellow, amorphous, albuminoid powder, by precipitating - and killing - the diplococci with absolute alcohol, thereafter dissolving the precipitate in water and evaporating.

Injection of a solution of this into rabbits, if not fatal, produced severe febrile disturbances; from which one may conclude that it is the circulation of the toxine which produces the pneumonic and other symptoms, especially the great depression consequent upon the invasion of the central nervous system, this continuing until an amount of antitoxine, sufficient for neutralization of the toxine, is formed within the circulation: anything short of this producing only an abatement of the symptoms. At the termination of the illness the serum of such a patient was found to have immunizing properties.

The marked resemblance of influenza to pneumonia demands that some further mention be made of the antitoxine of the latter disease, and that by way of a brief resumé of the various experiments that have from time to time been made for its production:

In 1888, Netter rendered mice and rabbits immune by injections of an emulsion made from the dried spleen of animals that had died of pneumonia.

Later Foa found that the injection of an attenuated culture of the diplococcus of pneumonia gave an immunity for several months. He next injected the serum of an immunized animal into another animal and found that it likewise became immunized.

In all cases one or two injections of the modified bacteria or toxine were sufficient for immunization. It was three days in the case of intravenous injection, and fourteen days in the case of subcutaneous injection before immunity was established, and the latter lasted a month or more.

The immunity was accompanied by the development in the blood of antitoxic substances, which had no effect, either outside or inside the body, in leading to the destruction of the pneumococci, but merely neutralized their toxins.

Such antitoxines not only protected a rabbit against subsequent inoculation with pneumococci, but, if injected within twenty-four hours after inoculation, prevented fatality.

Washbourne was likewise able to obtain a serum, by immunizing a horse, of high protective power.

To what the protective power of such serum is due is entirely beyond the scope of this essay: the theories held regarding it are both numerous and conflicting. It may be as well, however to mention in passing a fact observed by Mennes, namely, that normal leucocytes only become phagocytic when they are lying in the serum of an animal immunized against the bacterium in question.

But, do the above observations teach us anything in regard to what takes place when a patient recovers from an infectious disease such as influenza <sup>or pneumonia</sup>? The opinion has been advanced that the crisis takes place when the balance of the antitoxine against toxine is in the favour of the former; but that the pneumococci <sup>in pneumonia</sup> after crisis are still vital and virulent has been proved by culture and inoculation. Against such directly, the antitoxine seems to have no effect, except perhaps slightly to reduce their vitality; but any toxine now elaborated by them is neutralized, as it were, and, consequently, produces no deleterious effects.

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M. J. C. P. T. H. S.  
Bacteriology  
p. 202

The writer is, of course, not unmindful of the fact that antipneumonic serum has not quite given the brilliant results in treatment that were expected of it. In the human subject it seems to have more effect on the bacteria themselves than on their toxins. Yet, this must be regarded as an advance in the right direction. G. E. Tyler reports having treated 141 cases with it, and with only twenty deaths.

It should also be taken into consideration that in most cases of pneumonia there is a mixed infection, whereas influenza is due to a specific bacillus and that alone; likewise that man is rather less susceptible to pneumonia than to influenza, whereas in animals it is markedly the reverse.

That there is an antitoxin produced in a case of influenza where recovery takes place, seems to be beyond question. The writer has preserved notes of several cases where there was a decided crisis, free diaphoresis, a rapid fall of temperature, and other suggestive features. Consideration of these cases and other temperature charts evidences the fact of the existence of a decided tendency to give to drugs the credit for this in many instances, whereas probably they had little to do with it, except perhaps that they were given at the identical time, just before nature was on the point of effecting spontaneous resolution. The protracted cases seem to have been undoubtedly due to a fierce struggle for mastery between the toxin and the antitoxin.

That Pfeiffer's bacillus should have been found many weeks, in certain cases, after recovery has been made much of; but cannot be considered as seriously interfering with the trend of our argument, or the conclusions here adduced, when considered in the light of the experiments named.

#### P A T H O L O G Y   A N D   M O R B I D   A N A T O M Y .

Our knowledge of the pathology of influenza is, as yet, very imperfect and the post-mortem changes are not at all characteristic. Although influenza clinically presents a very distinctive picture, it cannot be said that the pathological changes are equally definite. They generally appear to be of a secondary nature, and as the complications of influenza are almost limitless, it would perhaps be a work of supererogation to consider here every anatomic lesion produced by the disease. The writer desires merely to consider briefly the pathological conditions which seem to him to be most characteristic of the influenzal attack as observed in general practice.

#### THE RESPIRATORY SYSTEM.

Catarrhal inflammation and congestion have been noticed at all parts of the respiratory tract, the same being, moreover, more or less under the circumstances, characteristic of the disease.

The mucous membrane of the nose and neighbouring cavities is red, swollen, and injected, and is frequently covered - as was specially

pointed out by Babes - with a somewhat characteristic, muco-purulent, tenacious exudate.

There is also redness, of varying intensity, of the mucous membrane of the trachea, larynx, and bronchi; these parts are sometimes coated with the tenacious, gray, or yellowish, mucus.

Ribbert has discovered a very marked cellular infiltration of the mucosa, together with an engorgement of the blood-vessels.

A sanguineous frothy mucus occupies the lumen of the bronchial tubes, in addition to a coagulated pus in certain instances.

These observations are interesting in that they throw considerable light on the clinical aspects of the sputum so frequently noticed. It is sometimes watery, containing purulent material in masses, and in an excessive amount. At other times it may be greenish-yellow in colour and in coin-like lumps: this is the most usual and characteristic type. More rarely it is darkened and sanguineous.

The injection of the mucous membrane is frequently spread over a large area, so as to give the impression of its being of the nature of an erysipelatous process, the impression being strengthened by the fact that these catarrhal changes show a marked tendency to advance, spreading from the nasal passages to the pharynx, larynx, and bronchi. At other times, however, the advance takes place from within outwards, e.g., from bronchi to larynx, and so on: still further, the catarrh appears to spread by continuity of tissue from whatever part it may have commenced: more rarely, the changes are localised - there is, as it were, a line of demarcation over which the catarrhal process does not pass.

The morbid changes in the LUNGS are most important, as the majority of fatal cases are due to pulmonary complications. Besides, the disease, which has hitherto been somewhat loosely described as the pneumonia of influenza, presents several important and striking peculiarities.

In the first place, it is always of the broncho-pneumonic type, very rarely croupous or lobar. As most of the necropsies have been made on adults, this catarrhal character of the pneumonic inflammation is very striking, as broncho-pneumonia, although common in children, is not at all frequently met with in adult life.

When typical lobar pneumonia does occur in influenza, the writer maintains that it is always due to a secondary invasion by the pneumococcus. In studying the post-mortem lesions of influenza, it is as well to bear in mind the fact that influenza frequently, as it were, opens the door for the entrance of other specific germs, such as, the streptococcus pyogenes, the staphylococcus pyogenes aureus, etc., and that these microbes, which are so closely connected with all suppurative processes, may play important secondary rôles in producing some of the changes about to be described.

After such digression, it may be noted with reference to the lungs that inflammation occurs often in disseminated areas. When extensive infiltrations occur, they are found to be composed of a number of lobular areas which are separated by aerated tissue; and, although there may be considerable fusion of these pneumonic areas, so that lobar pneumonia is closely simulated, yet, on close and careful

examination, these consolidated areas can usually be recognised as being made up of the separated pneumonic areas which still enclose aerated patches.

The cut surface of the lung has a chequered appearance, and is, moreover, usually smooth, and wanting the typical granular appearance of a fibrinous pneumonia. The consolidation, in point of fact, presents the appearance of splenification rather than that of an hepatisation.

The microscopical changes in the lung likewise present several peculiarities. This department of our subject has been most exhaustively investigated by Pfeiffer, who conducted his examinations over the entire bronchial tree, carefully taking microscopic sections from all parts of the lung substance.

In the larger bronchi he found the following changes: Partial destruction of the ciliated epithelium, some epithelial fragments lying free in the lumen of the bronchus. In some places the epithelium was seen to be raised from its base by pus cells. The latter were likewise observed lying in small masses, apparently on the intact epithelial edge, where they seemed to have made for themselves a pathway between the cylindrical cells. They were, moreover, seen to fill up all the cavities left by the falling out of the ciliated epithelium, in the epithelial bed, the capillaries in the neighbourhood of the bronchus being engorged with blood, and the peribronchial connective tissue studded with wandering cells.

The changes observed in the smaller bronchi are very similar: sometimes the entire lumen is found to be filled with coagulated mucus containing pus cells.

In the lung substance proper are observed small purulent areas. At different points the structure of the lung is entirely gone: this is probably due to small abscess-formations. In the neighbourhood of the purulent infiltrations, the alveoli are found to be packed with large numbers of round cells; and amongst them are to be found pale swollen and pigmented cells, supposed to be the epithelium lining the lung channels. If these cells be now stained by Weigert's method, it will be seen that fibrin is entirely absent from the central parts of the infiltrated areas, and is present but sparsely in the outer zones.

Pfeiffer considers these lesions to be quite characteristic of the pneumonia of influenza and to readily distinguish it from pneumonia of a croupous type, from whatever cause arising.

Another point, which, although mentioned lastly, is by no means the least important, is the fact that the small bacilli of influenza are recognizable, deeply stained, and in enormous numbers, in the bronchi, both upon and between the epithelial cells, as well as in masses beneath the same. In the submucous tissue, however, they are found, as a rule singly, and in insignificant numbers only. The round cells, which have been considered already as filling up portions of the lung, are also found to be loaded with bacilli.

#### THE PLEURA.

Pleurisy is not common, but it has been observed, and the bacilli of influenza found in the serous and muco-purulent exudate.

DIGESTIVE TRACT.

There is, most usually, merely a catarrhal condition of the mucous membrane of the stomach and intestine: deep ulcerative processes are of exceedingly rare finding.

The mesenteric glands may be slightly enlarged and congested.

HEART.

Pericarditis and endocarditis have both been recorded. Sometimes softening and degenerative changes are noticed in the heart muscle.

LIVER.

This does not, as a rule, present any characteristic changes.

KIDNEYS.

The kidneys present the changes to be expected when it is remembered that albuminuria is not an infrequent complication of influenza; that is to say, they show inflammatory changes very closely resembling those of post-scarlatinal nephritis. Babes has discovered and described parenchymatous changes, and Weichselbaum a cloudy swelling.

NERVOUS SYSTEM.

The Brain.-

The morbid changes that have been observed in the nervous system seem, so far, to somewhat inadequately explain the many and marked neural phenomena seen at the bedside, especially in the course of a severe attack, in the case of a neurotic patient. Even the many definite and intractable nervous sequelae, that so frequently remain after a grippal seizure, do not seem to produce any constant and invariable pathological alterations.

Hyperaemia of the membranes of the brain has been frequently noticed, especially about the base of the skull. The arteries have sometimes been seen to be filled, almost to bursting point. Furbringer and Babes have both recorded cases of purulent meningitis. Abscess of the brain has been noticed by Bristowe, while Pfuhl has seen calcareous degeneration.

The Spinal Cord.-

The spinal cord may show congestions of its coverings: Foa has described the finding of numerous haemorrhages.

D I A G N O S I S.

The diagnosis of influenza does not, as a rule, present very great difficulty: this is especially the case during epidemic periods. It is, however, the not uncommon sporadic cases, or the first few cases at the commencement of a general epidemic, that give most trouble in this respect. The same may, of course, be said with regard to all epidemic



disorders, of any magnitude, hesitation with regard to the first case or two of a newly-arrived series being a common experience. The writer has found this to be so on more than one occasion in regard to such diseases as typhoid fever. How difficult it is to establish a diagnosis of one's first case of enterica, after a long period of freedom from that disease! How one hesitates, and finds it necessary to suspend judgment for a few days before one can decide, during which time, especially in private practice, one may be driven to exasperation by the pesterings of the friends of the patient for a certain opinion! Yet, perhaps it is impossible to overestimate the importance of the early and accurate diagnosis of a case of influenza as a preventive of the disease assuming epidemic proportions.

The writer has found it useful for diagnostic purposes, when a case suspicious of influenza presents itself, to bear in mind the four chief varieties of the disease:

(1) The catarrhal form, in which the catarrhal symptoms predominate.

(2) The thoracic form, in which, with or without catarrhal manifestations, there are symptoms of a profound involvement of the thoracic viscera.

(3) The abdominal, or gastro-intestinal, form, in which the disturbances of the digestive tract are most noticeable.

(4) The nervous, or cerebral, form, in which the neural phenomena attract one's attention.

These are useful standpoints from which to reason away any difficulties arising. The writer by no means intends to insist that it is always possible to place every case of influenza under one or other of the above categories, especially when it is remembered how infinite are the varieties and vagaries of the disease, and how in actual practice one often meets cases in which <sup>two</sup>~~one~~ or more types are associated, or intermingled. Nevertheless, considerable assistance can be derived by taking a comprehensive view of all phenomena occurring; besides which, there are several symptoms which are common to all forms, thereby enabling one to make what may be termed a GENERAL DIAGNOSIS of influenza, for which purpose the writer has found the following points to be the most important:

(1) The sudden onset of the disease.

(2) Extreme prostration, lassitude, and great depression - physical and mental - out of all proportion to the other concomitants of the febrile attack.

(3) Intense headache - usually frontal or orbital.

(4) Pains in the loins and general soreness of the muscles, the patient feeling as if he had been bruised and generally maltreated; the pains, moreover, by no means follow the distribution of particular nerves, being, on the contrary, myalgic, rather than neuralgic.

(5) A tremulous, large, and soft condition, of the tongue, the same being also indented by the teeth; moist, and nearly always coated with a thick fur, and accompanied by a foul breath.

(6) Profuse perspirations, at times the sweat being attended with a peculiar odour, described by some as fusty, mousy, mouldy, or peppery, perhaps more aptly as sour. The odour is likewise peculiar in that

it is easily recognised, but, like most smells, most difficult to accurately describe.

(7) Cutaneous hyperaesthesia.

(8) Fever, variable in character, usually 100° to 104°F. The chart, however, is not distinctive; and it is as well to remember that influenza is sometimes an afebrile disease.

(9) Insomnia: as a rule, if snatches of sleep are obtained, the rest is disturbed by disagreeable dreams.

(10) A pulse not accelerated in proportion to the other symptoms. It beats usually 90 - 100, is soft and compressible, and liable to become dicrotic.

(11) Coryzal symptoms, with some cough, the latter sometimes being hard and paroxysmal. Sharp sticky râles are heard at the bases of the lungs, and present the peculiarity of being of medium size, sharp in quality, and conveying the impression of a peculiar viscosity of the contents of the smaller bronchial tubes.

The above are briefly the cardinal points which have on so many occasions proved useful to the writer in making a general diagnosis of influenza. To go more fully into the subject here would necessitate the repetition of much that will be considered under the heading of symptomatology.

#### DIFFERENTIAL DIAGNOSIS.

The diseases with which influenza is most often confounded, and from which it requires to be carefully differentiated are:

- (1) "Common cold".
- (2) Lobar pneumonia.
- (3) Scarlet fever.
- (4) Measles.
- (5) Malarial fever.
- (6) Cerebro-spinal meningitis.
- (7) Enteric fever.
- (8) Dengue.

The points of resemblance between influenza and the above diseases may now be considered, and accentuation made of merely the more important. The tabular method will be adopted wherever possible.

<u>Dengue.</u>	<u>Influenza.</u>
A disease of hot countries.	Common everywhere.
Extension slow and from circumscribed areas	Extension rapid, invading large tracts simultaneously.
Onset always sudden.	Onset usually, but not always, sudden.
Temperature always very high.	Not usually very high, though often so; at most uncertain
Eruption constant and characteristic.	Eruption inconstant, irregular in presence and description
Hardly ever fatal.	Frequently fatal.
Occurs at all ages.	Principally in adults.
Pulmonary complications rare.	These frequent and serious.
Dyspnoea seldom or never seen.	Dyspnoea: frequent.

Lengthy incubation; never less than 4 days. Incubation shorter.

Pains severe (Rush describes the disease as "break-bone fever"); especially so in knees and calves and roots of the hair, so as to cause the slightest touch to be intolerable, frequently showing a marked preference for the joints.

Fever characteristic: there is usually one paroxysm, sometimes two; there is a steady rise of temperature until the acme is reached, then a short stadium followed by a remission, then a secondary rise: the fever usually lasts about five or six days. Fever irregular, usually lasting from two to four days.

Rash an important symptom: there are generally two eruptions: the first rash comes out on the third day, and resembles that of scarlet fever; it lasts from 24 to 48 hours, when it disappears, and there is a remission for two or three days - sometimes four - when the patient feels fairly well, then the second or terminal rash comes out, with a return of former symptoms. It consists of circular, elevated, discrete, reddish, spots; appears first on the hands, but very soon becomes general. A coalescence of the spots may be seen to give the spots an urticarial appearance: it is followed by itching and peeling. Rash an unimportant symptom.

#### Simple Nasal Catarrh, Coryza, or "Common Cold", and Influenza.

These two conditions resemble one another in that in each of them there is a feeling of malaise following a period of chilliness; signs of catarrh of some portions of the respiratory tract, with redness and swelling of the nasal mucous membrane; slight soreness of the throat; stiffness of the neck; fever, with the usual concomitants: both at times assume epidemic proportions, but coryza less so than influenza.

These two conditions are constantly confused by the laity. So much so is this the case, that almost every patient with a severe cold greets his physician with the remark that he "has got the influenza". Fortunately, now that the nature and symptoms of influenza are so much better understood than heretofore, these two diseases are less often confused by the profession. The following points, in the vast majority of instances, suffice to distinguish them:

<u>Influenza.</u>	<u>Coryza.</u>
Occurs at all seasons and is independent of climatic influences.	Most common in winter and spring; is usually attributed to sudden vicissitudes of the weather, or exposure to strong draughts of air.
Sudden onset; frequently rigors.	Onset less abrupt; usually preceded by merely a felling of chilliness.
Headache, backache, and general muscular uneasiness, very severe.	Not so severe.
Greater prostration, which continues for a longer time: the prostration seems out of all proportion to the catarrhal symptoms.	Less prostration: the same lasting for a shorter time, and not out of proportion to the catarrhal symptoms.
Temperature higher.	Temperature less high.
Catarrhal disturbances at first local, but showing a marked tendency to spread rapidly to other parts of the system.	Catarrhal disturbances usually remain local, without showing the same tendency to extend rapidly and widely.
Sputum characteristic; contains Pfeiffer's bacilli in abundance.	Sputum usually phlegm; does not contain Pfeiffer's bacilli.
Convalescence slow; recovery often incomplete.	Convalescence rapid; recovery usually complete.

#### Influenza and Pneumonia (Lobar).

These two diseases may easily be mistaken the one for the other, especially at the outset, and before the characteristic physical signs of lobar pneumonia have developed. In both there is sudden onset, in addition to malaise, fever, and signs of thoracic involvement. The following points, as a rule, serve to distinguish them:

<u>Influenza.</u>	<u>Lobar Pneumonia.</u>
Initial rigors less severe.	Initial rigor constant and more severe; may last for from 15 to 30 minutes.
Nervous depression, myalgia, and neuralgic pains, more marked; patient greatly prostrated.	Less pronounced; patient seems very ill but not so markedly prostrated.
Temperature irregular; returns to normal, in uncomplicated cases, in from 2 - 4 days.	Temperature suddenly rises; remains high; and falls by crisis on the fifth to the eighth day.
Breathing not markedly accelerated.	Breathing markedly accelerated, rapid, and shallow; the alae nasi are in active motion.
No marked disproportion between pulse-rate and respirations.	Striking disproportion between pulse-rate and respirations.

Influenza.

Pain all over the body; patient can find ease in no position, so is restless, tossing about from side to side in bed.

Lung-involvement usually bilateral

Physical signs of broncho-pneumonia; the consolidation is found to be patchy and scattered all over the lungs.

Herpes of lips not constant.

Urine febrile; amount of chlorides normal.

Sputum contains Pfeiffer's bacilli; usually muco-purulent.

Influenza and Measles.

These two diseases begin with fever, and show signs of catarrh and conjunctivitis; but, as the eruption of measles usually manifests itself on the fourth day, all difficulty of diagnosis ceases thereafter. The following distinctive features serve for differential purposes.

Influenza.

Attacks all ages equally.  
Shorter period of incubation, usually 2 - 4 days.  
The fever is irregular.

Eruption not constant.

Lobar Pneumonia.

Pain usually located in the mammary region; patient usually lies quietly on the affected side, as it is painful to move about.

Generally unilateral.

Usually physical signs of lobar pneumonia; the consolidation is usually at the base; the limits of the consolidation are clearly defined over the affected area; there will be found tubular breathing; the dullness is well-marked; vocal fremitus and resonance are increased; and there is usually some obliteration of the intercostal depressions, with slight increase of thoracic measurements.

Usually present.

Urine febrile; marked absence of chlorides.

Rusty; contains the pneumococci and frequently Fränkel's pneumobacillus.

Measles.

Usually children.  
Longer period of incubation, 10 - 14 days, or more.  
The fever is continued in type, with slight evening exacerbations; frequently there is a marked intermission on the second or third day, after which the temperature curve pursues the usual course.  
Eruption constant; appears on the evening of the third day: on the face generally, and first in the region of the ears.

Influenza.

The eruption, as a rule, is erythematous in character.

Koplik's spots absent.

At the time of inditing this essay, the writer is in the midst of an epidemic of measles of a severe character. Every case he has attended so far has commenced with epistaxis: indeed, this symptom has been so alarming in many cases, that it has been the main cause of his professional services being required.

Influenza and Scarlet Fever.

Influenza and scarlet fever frequently resemble one another in the sudden onset, catarrh of the nose and throat, involvement of the cervical glands, an erythematous rash, fever, headache, and vomiting. The following diagnostic points are of differential value.

Influenza.

Prostration more profound.  
Pulse not accelerated out of proportion to the temperature, but is small, feeble, irregular, or even intermittent.

Tongue coated, swollen, and moist.

The mucous membrane of the throat usually only presents redness and signs of catarrh; in some cases there is a peculiar œdematous condition of the tonsils, uvula, etc., which has been termed "solid œdema", as puncture gives exit, not to serum, but to a peculiar sanious lymph-like material.

Measles.

The eruption consists of dusky-red blotches, the spots being smooth and slightly raised, and diffused all over the body, but most marked on the face, in which locality the patches tend to assume a somewhat crescentic arrangement, or to coalesce; the rash fades within 3 or 4 days, and is followed by a powdery desquamation.

Koplik's spots present, and appear on the first day of the disease (very important).

Scarlet Fever.

Less profound.  
Pulse very rapid and accelerated out of proportion to the temperature; beats 140 - 180 to the minute; is hard and wiry.

Tongue at first coated with a creamy, whitish, fur through which the hyperæmic papillæ project (white strawberry); in the course of a day or two, it acquires the characteristic red strawberry character.

The mucous membrane of the throat appears rich red, and velvety, with swelling, and a somewhat punctate hyperæmia, which is very characteristic.

Influenza.

Rash not constant; usually erythematous; may occur at any time during the disease; seldom universal.

Scarlet Fever.

Rash constant; erythematous, with a distinctly punctate appearance; it occurs on the first day of the attack; breaks out first on the chest, neck, and arms, and soon becomes distributed over the whole body; it is followed by a very characteristic desquamation.

Influenza and Malaria.

These two maladies, as a rule, cause but little confusion, at least in the British Isles. Nevertheless, it must be remembered that the rigors, fever, and sweating do, in certain cases of influenza show a decided rhythmic character. The following points are useful in distinguishing them:

Influenza.

Universal.  
Contagious.  
Blood usually normal: some authorities maintain that Pfeiffer's bacilli can be isolated.  
Periodicity not usual.  
Temperature irregular.  
Spleen not constantly, or only slightly enlarged.  
Quinine useful, but not specific.

Malaria.

Peculiar to certain localities and endemic there.  
Not contagious.  
The blood contains the malarial plasmodium.  
Marked periodicity of the symptoms - cold, hot, and sweating periods.  
Temperature characteristic, denoting quotidian, tertian, or quartan varieties of the disease.  
Marked splenic enlargement in all cases.  
Quinine a specific.

Influenza and Cerebro-spinal Meningitis.Influenza.

Vomiting not constant.  
Delirium slight; retraction of the head not marked.  
Strabismus rare.  
Tremor and rigidity not constant, and transitory.  
Kernig's sign absent.  
Lumbar puncture usually gives a normal fluid.

Cerebro-spinal Meningitis.

Vomiting always present, and of the typical nervous kind.  
Delirium more marked and constant; retraction of the head more prominent.  
Strabismus common, especially in children; inequality of the pupils a feature of the attack.  
Tremor more constant, more marked, and with spasm.  
Kernig's sign present.  
Fluid so obtained usually turbid, and contains the diplococcus intracellul-

Influenza and Typhoid Fever.

These two disease, in the early stages of the attack, very often closely simulate one another, especially when the former is of the gastric type. In both there is prostration, as well as headache, and there may be also abdominal tenderness and diarrhœa. Cases of enterica with early involvement of the respiratory system are especially perplexing. The danger of confusing the two maladies, however, can usually be prevented by remembering the following points:

Influenza.

Begins suddenly.  
 Attacks all ages, and is independent of the season of the year.  
 Pain all over the body.  
 Tongue moist and coated.  
 Irritability.  
 Epistaxis not very frequent.  
 Temperature curve irregular.  
 Spleen only slightly enlarged, and not always so.  
 Rash, if present, usually erythematous.  
 Widal reaction negative.  
 Ehrlich's reaction seldom observed. \*\*\*

Typhoid Fever.

Begins gradually.  
 Greatest susceptibility between the ages of 15 and 25, and is most common in autumn.  
 Pain chiefly in the head.  
 Tongue usually red and glazed, especially in the latter part of the illness, when its becomes characteristic.  
 Apathy.  
 Epistaxis frequent, and when associated with a steadily rising temperature is very suggestive.  
 Temperature curve shows marked evening exacerbations, and a gradually ascending scale; fall takes place by lysis.  
 Spleen more constantly and markedly enlarged; marked tenderness of the abdomen and gurgling, especially in the right iliac fossa.  
 Rash consists of rose-spots on the abdomen, which disappear on pressure, and come out in successive crops, and from them the typhoid bacillus can be isolated.  
 Widal reaction positive.  
 This reaction frequently noticed.

\*\*\* On February 13th, 1902, the author was called in to see a healthy young artisan, aged 19, who presented all the typical symptoms of an acute attack of influenza of the catarrhal type. The diagnosis of influenza was verified bacteriologically. On the 14th February, the urine gave most markedly the diazo-reaction of Ehrlich, and continued to do so until the 18th of February, when it disappeared, and by the 24th of the month the patient had completely recovered. This case is mentioned as it is interesting. The reaction, however is so common in typhoid fever as to be regarded as almost characteristic of that disease: Osler states that he has found it in 543 out of 796 cases



S Y M P T O M A T O L O G Y .

C L I N I C A L H I S T O R Y .

The greatest variation as regards intensity may be presented by influenza in individual cases (from the most trifling indisposition to an illness of the gravest kind, terminating in death), such variety of manifestation depending upon: (1) The previous health of the individual, his age, and power of resisting depressing influences which he possesses; (2) the energy and amount of the specific poison of the disease to which he has been exposed; and (3) the nature of the prevailing epidemic.

The fact, however, should not be lost sight of that cases of very great severity are occasionally encountered during the prevalence of mild epidemics. Again, in every epidemic a large proportion of the community suffer from influenza in the mildest, or the so-called "r u d i m e n t a r y f o r m", characterised by general malaise, disinclination for exertion or mentation, however slight, mental dulness or hebetude; to which nervous disturbances are added, and catarrhal symptoms, as coryza, sore-throat, hacking cough, etc., but without the development of a proper fever. Other cases, again, present the symptoms of acute coryza, laryngitis, bronchitis, pharyngitis, but with constitutional disturbances, as severe headache, and pains in the back and limbs, but yet, in spite of only very slight febrile concomitants, these patients are ill enough to take to bed.

The incubation period of influenza is short, seldom exceeding three days.

The onset, in severe cases, is usually abrupt, and attended with decided chills, or by malaise lasting several hours, with slight chills alternating with heat. Only in rare cases does one observe malaise lasting for several days, and an established cold beforehand. The elevation of the temperature will be found to be as sudden as the invasion of the disease, and to touch 104° or 105°F., in addition to which the patient suffers from marked prostration, intense headache, and severe muscular pains. In rare cases, the disease may be ushered in with giddiness, fainting fits, bilious vomiting, epistaxis, and sudden profound prostration. The latter phenomenon characterizes most cases during the invasion; and amongst the prominent nervous symptoms are depression of spirits, restlessness, insomnia, - rarely undue somnolence, - and delirium.

Both general and local symptoms exhibit considerable variety, as does also the severity of the primary fever. The latter, however, nearly always becomes rapidly established, has normal remissions, and is usually moderate - rarely of a high degree. The patient is apt to suffer from great chilliness (more especially should the external temperature undergo lowering), followed sometimes by flushes of heat, or accompanied by reducing sweats. The febrile outbreak is sometimes preceded by intense frontal headache, with pain in the orbits, at the root of the nose, temples, and occiput. The pain is a most striking feature of the disease, and is, in addition to the above situations, frequently of a neuro-muscular character, and, still

further, referred to the lumbar spine. Hyperaesthesia of the skin may be observed, as also areas of burning cutaneous pain. It is a common experience to find the pain assuming the form of neuralgia of individual nerves or of pleurodynic stitches, or of burning, boring, muscular disturbance. Sneezing, redness of the eyes, and edges of the nostrils, a more or less abundant, thin, discharge from the nose, and lachrymation, may be observed, as also, in occasional instances, a sharp epistaxis. The patient's throat becomes sore; there is a tickling sensation in the upper air-passages; a dry cough; hoarseness; and dyspnoea. The cough may be paroxysmal, hard, and irritating, sometimes, indeed, inducing vomiting as observed in whooping-cough. Attending the development of the catarrhal symptoms one finds the chest-pains, pleuritic stitches, anosmia and loss of taste, much in evidence. Accompanying the fever will be great depression, pains in the limbs, anorexia, thirst, constipation, and a diminished secretion of urine. The temperature itself, as stated, may attain a great height at the onset of the attack, and will in that case remit towards the morning following. The temperature curve is usually very irregular, and often terminates by an apparent crisis.

The pulse is small, feeble, running, irregular, or even intermittent, but, as a rule, is only moderately increased in frequency; it may even be unusually slow. There is, in many cases, slight, or even decided, blueness of the lips and finger-tips. The patient soon becomes exhausted by restlessness and want of sleep.

At the end of four or five days, the febrile symptoms decline, at times gradually, often rapidly, with copious sweats or critical diarrhoea; but, when severe complications have occurred, the fever may be observed to last ten or twelve days. The defervescence is marked by an increased flow of sedimentary urine, and marked amelioration of the subjective symptoms: the catarrhal ones, however, outlast the fever two or three days, and the cough and expectoration may not disappear for a considerable period.

The depressing effect of the poison of influenza upon the heart may at times threaten the patient's life. It is a rare thing to find a marked leucocytosis, but a mild leucocytosis (10,000 - 15,000) may occasionally be encountered, in uncomplicated cases.

In certain cases the abdominal symptoms may be unduly prominent, while those referred to the chest and head are less urgent, the disease assuming the form of a more or less severe catarrh of the gastro-intestinal mucous membrane, with disturbance of the functions of the liver. The fever and peculiar nervous depression are, however, the same; and one occasionally comes across cases in which but little tendency to localisation of the catarrhal process is observed, and in which there is fever of varying intensity, with great depression, and simultaneous and equal implication of the head and the thoracic and abdominal organs.

#### Duration of the Influenzal Attack.-

Mildest forms of influenza last from two to three days; in well-developed cases without complications, convalescence sets in between the fourth and tenth days; while severe cases with complications last

much longer, several weeks elapsing before recovery is complete.

## C L I N I C A T T Y P E S .

Many authorities (notably Althaus) have described different types of influenza based on the differences in the local manifestations; but, in actual practice, it will be found that the various types enumerated merge so quickly and frequently into one another, and are so modified by the individual peculiarities of the patient, and by the complications which arise in the course of the attack, in consequence of such peculiarities, or of previously existing diseases, or tendencies to special forms of disease, that, in point of fact, and in view of the remarkable protean nature of the features of the disease, particular cases cannot usually be referred to theoretical categories. Thus, hysterical persons, and those of a neurotic temperament, are especially prone to suffer from the peculiar nervous symptoms of influenza. The disease is, moreover, modified by the age of the patient, it being a common experience to find children manifesting to a high degree the symptoms of cerebral congestion, while old persons are subject in a peculiar manner to dangerous pulmonary complications, and those of a gouty or rheumatic diathesis suffer more than others from muscular pains.

Qualified in this way one may conscientiously arrange the clinical types of influenza into the following categories:-

### 1. The Respiratory Type.

In this form of influenza the local catarrhal symptoms are of speedy development, being first evidenced by conjunctival suffusion, excessive lachrymation, sneezing, and a modicum of pharyngitis; following which, one usually observes hoarseness, and a cough of a hard, paroxysmal character, like unto that of pertussis, and due to irritation of the larynx and trachea. Accompanying the cough is expectoration, but seldom to a great extent, and the physical signs of bronchitis are usually of a negative character: rarely does one come across a case of profuse expectoration, and one with physical signs of an established bronchial inflammation.

### 2. The Gastro-intestinal Type.

The brunt of the attack centres itself in the digestive system: more especially in children, in whom, moreover, vomiting occurs early, and is apt to be repeated at longer or shorter intervals; apart from which, however, there is usually considerable abdominal pain and a more or less urgent diarrhœa.

### 3. The Cardiac Type.

Cardiac disturbance with heart-failure and oppression, and a rapid pulse, pulse characterize this variety.

### 4. The Nervous, or Typhoid, Type.

In this form of influenza, the fever is of the continued kind, and the typhoid state may supervene, the general symptoms being of the comatose or delirious class.

### 5. The Rheumatoid Type.

In this variety, the attack is characterized by the presence

of "rheumatic pains" in the skeletal muscles over the entire body, but without visible changes in the joints or nerve-trunks.

#### 6. The Apyretic Type.

Apyretic forms of influenza have been described by Huchard (Bull. Acad. de Méd., Feb. 17, 1900) in which there may be marked pulmonary congestion, or actual lobar pneumonia, without fever, without expectoration, and often without cough, the condition being often only discovered on auscultation.

#### 7. The Ambulatory Type.

So called because such cases, not sufficiently ill to be bed-fast, intermingle with others and so spread the disease.

### ANALYSIS OF SYMPTOMS: COMPLICATIONS

#### AND SEQUELAE.

#### F E V E R.

The temperature of influenza is of a very variable character: even at the beginning of the disease, in the severer cases, it may attain a fair height. It is usually of the remittent or sub-continuous type; its course is lower during the day, but towards evening, and at night, is marked usually by increase in the constitutional disturbances, and a rise in the frequency of the pulse, and a continuous heat, in which case the pyrexia attains a high degree. The course of the temperature is lower during the day. On the whole, the range of the temperature is irregular, and this feature may be of diagnostic importance. The intensity of the fever may manifest considerable variation - from mildness to severity, 102° or 104°F. being the usual in a severe case. In some cases, again, it may rise transiently as high as in pneumonia. In weakly persons and in the aged it is often adynamic.

#### P U L S E.

The pulse has no constant characteristics. It may be full and moderately accelerated (90-100), but is often small and weak. As a rule, it is less forcible than in health, is generally compressible, often irregular, and changing in character from six to eight hours.

#### U R I N E.

A diminution in the secretion of the urine is usual, but it is less concentrated and high coloured than in other fevers. On being allowed to stand, a deposit of urates will be observed, which towards the end of the fever may be very abundant. In uncomplicated case, no albuminuria is present. The quantity of urine voided is markedly increased with the defervescence of the fever.

#### S K I N.

At the beginning of the fever, the skin is dry and hot, but frequently sweats occur; and the remissions and defervescence of the disease are often ushered in by a profuse sweat of an acid reaction

and a strong smell. In some cases a tendency to sweat shows itself early and is continuous throughout the attack. Sudamina occur in great numbers. The face is often flushed and irregular mottlings of the skin, especially upon the neck and chest, have frequently been observed. Herpes may occur upon the lips and chin; and, towards the end of the attack, is regarded by many as a favourable sign. The erythematous character of the rash which is sometimes present, and the peculiar odour of the patient, have already been referred to.

#### D I G E S T I V E S Y S T E M .

Many cases exhibit digestive disturbances of a more or less prominent character. Frequently they are such as are common to the febrile state, namely, anorexia, thirst, disordered taste, coated tongue, tenderness in the epigastrium, and constipation: nausea and vomiting frequently usher in the disease. In many cases there may be severe gastro-enteritis, with frequent vomiting, purging, and intense abdominal pains: Occasionally haemorrhages from the stomach and bowels have been observed. Catarrhal jaundice may develop, which, gastro-intestinal symptoms are common in young children, and much more so than in adults. The influenza bacillus has also been known to produce appendicitis.

#### R E S P I R A T O R Y S Y S T E M .

As a rule, a more or less considerable portion of the mucous membrane of the respiratory tract is affected by influenza, and this is a characteristic feature of the disease. The symptoms are essentially of a catarrhal nature. Usually, therefore, one observes the patient to be suffering from a severe "cold in the head", with considerable discharge from the nose, and sometimes epistaxis; redness of the conjunctiva, with abundant lachrymation; catarrh of the mucous membrane of the throat, larynx, and bronchi; also sore-throat, difficulty of swallowing, hoarseness, irritative cough, and a burning or tickling sensation in the throat. The mucous membrane of the cavities of the nose, mouth, and pharynx, is usually reddened and congested, and the tonsils swollen.

Cough is always a troublesome symptom, and is apt to be both frequent and distressing, or, again, paroxysmal from the invasion of the disease, and almost always so in some part of its course. So much so, indeed, that in the older epidemics the disease was often reported as whooping-cough. It usually continues both day and night, being worse at the latter time, thereby preventing the patient from sleeping, and disturbing the household. The cough, moreover, frequently excites attacks of vomiting, and by its virulence and persistence gives rise to pain and soreness in the respiratory muscles, occasionally to hernia. It is at first dry and attended with a scanty expectoration; later on, the sputum becomes opaque and muco-purulent, and in consumptive, or plethoric, individuals, or those afflicted with mitral disease, the expectoration may be blood-stained. The urgent and spasmodic nature of the cough towards the end of the illness becomes less noticeable: in some epidemics, indeed, cough is not a

prominent symptom; and cases are, moreover, encountered in most, if not all, epidemics in which the disease runs its course without unusual, peculiar, or excessive cough. If the cough be due to bronchitis, there will be the usual physical signs of that condition; but if due to mere irritation of the larynx, and trachea, they will, of course, be wanting. So it is that one frequently discovers on auscultation sonorous and sibilant, or mucous or subcrepitant râles upon both sides of the chest in the course of the attack, as in ordinary acute bronchitis; and, on the other hand, cases are met with where the auscultatory signs are but little, or not at all, altered from those of health. It follows, therefore, that there are no special physical signs which can be regarded as characteristic of influenza.

Attacks of dyspnoea are frequently suffered from in the course of the attack of influenza; and, although due in some instances to complications, they may occur with remarkable frequency in those in whom none of the objective signs of any pulmonary lesion can be discovered: the nervous origin of such can be presumed. Graves (Clicical Lectures on the Practice of Medicine, 2d Ed., vol. I, Dublin, 1848), however, attributes its origin to direct disturbances in the functions of the vagus nerve; and considerable weight is given to this opinion by the observance that the dyspnoea is now and then intermittent or shows rhythmical<sup>ly</sup> recurring remissions, which are unattended by alteration of the physical signs. Biermer (Virchow's Handb. der Spec. Pathol. u. Therap., Erlangen, 1865, V, Pt. I, 592) considers it more probable that the congestions so common in influenza, not attended by marked physical signs until they lead to œdema, are to be regarded as the cause of the dyspnoea, exhibiting, as it does, such marked variations in intensity, and proceeding in many patients to marked oppression, distressing shortness of breath, precordial pain, and so forth. In many patients these phenomena are accompanied by pleuritic stitches and substernal pain, without appreciable physical signs. In certain epidemics orthopnoea, and suffocative attacks, are common.

The serious affections of the lungs which so often complicate influenza are of great interest and importance. Commonest amongst these is the congestion and severe bronchitis already noted as of frequent occurrence in the severer cases. Such bronchitis is regarded by many as an essential process of particular forms of influenza rather than a complication proper. Under the latter category may appropriately be included the capillary bronchitis, catarrhal and croupous pneumonia, arising in the course of the disease. So far as can be ascertained from available statistics, from 5 to 10 per cent. of all influenzal patients suffer from pulmonary mischief of an inflammatory nature. This estimate of the approximate average of the thoracic complications of influenza must, of course, be qualified by the variation in their frequency according to the virulence of the particular epidemic under consideration.

To detect the occurrence of capillary bronchitis may in the early stages be a matter of considerable difficulty, owing to the masking of the physical signs and the prominence of the pre-existing œdema. The nature of the bronchial lesion, however, is usually suggested by

the increasing dyspnoea, lividity of the face and limbs, and great prostration; in addition to which crepitant and subcrepitant râles at the bases of the lungs behind, rapidly spreading to all parts of the chest, without dulness at first and with increased resonance later, instead of the signs of consolidation common to pneumonia, are the signs which herald its appearance.

About the fourth or fifth day - sometimes as early as the second day, or much later during convalescence - catarrhal pneumonia may occur, usually insiduously, and with gradual intensification if the bronchitic symptoms, but without chill or marked rise in temperature. The complications just described are particularly apt to attack old persons, and the debilitated from any cause. In such patients, moreover, a fatal result occurs with great frequency.

Lobar pneumonia is likewise a frequent and fatal complication. It may arise early and in rare instances insiduously, but is, however, especially frequent towards the close of the attack or during the early part of the convalescence when the patient is beginning to go about. The symptoms of its occurrence - differing in no respect from acute lobar pneumonia under other circumstances - are nearly always sudden in their onset, and speedily involve the patient in an extremely dangerous illness. Should the condition develop at an early stage of influenza - which is very rarely the case - the symptoms of the lobar inflammation undergo modification from the usual, in that the preliminary chill, and the pain in the side of the chest, and the characteristic subcrepitant râles may be absent altogether: not so, however, the ~~sub~~crepitant râles, which are very noticeable; and out of all proportion to the extent of the lobar inflammation present is the dyspnoea which the patient suffers from. Blood-examination nearly always shows marked leucocytosis, which, with the other features enumerated, are likewise observed in the pneumonia of convalescence.

Graves, in his "Annals of Influenza", gives it as his opinion that in some cases a kind of paralysis of the lungs, with great œdema, occurs from an affection of the pneumogastric nerve; stating also that the poison which produces influenza acts upon the nervous system in general, and on the pulmonary nerves in particular, in such a way as to produce symptoms of bronchial irritation and dyspnoea, to which bronchial congestion and inflammation were often added.

Collapse of the lungs, in localized areas, may often be detected on physical examination. Such consolidations of the lungs have often been attributed to congestive collapse due to enlargement of the tracheal and bronchial glands and disturbances of the nerve plexuses at the root of the lung. This glandular enlargement - so-called "adenopathie bronchique" - may be detected by percussion according to the method of Geneau de Mussy (Chirurgie médicale, Paris, 1874), who appears to have been the first to call attention to the importance of percussing the spinous processes of the vertebrae over the course of the trachea. When the tracheal and bronchial glands are enlarged, the tubular, high-pitched, and slightly tympanitic, sound elicited in health over the upper dorsal vertebrae (down to the fifth) is replaced by dulness, which usually contrasts sharply, above with the

tracheal, and below (from the fifth downwards) with the vesicular resonance.

The possibility of the consolidations, in the beginning at least, not being pneumonic at all, is suggested, moreover, by certain peculiarities of the so-called pneumonias of influenza. Thus, one may find at first weakness of the vesicular murmur, then its absence; the respirations soon become bronchial, without being preceded by dulness or crepitant râles; the extension of the consolidation from one part of the lung to the other is very irregular; the process is more apt to involve both sides than one; the disappearance of the consolidation is often very rapid. The relation of cause and effect, between collapse and catarrhal pneumonia, are so close that it can be readily understood how the condition described may lead to secondary lobular or catarrhal pneumonia; and this, moreover, frequently results from collapse however induced.

Abscess and gangrene of the lungs and pneumothorax are extremely rare complications of influenza, but have been reported by Drasche ("Ueber Infl." - Wiener med. Woch., 1890, 6, 17, 19, 21), Fürbringer ("Pericarditis mit Pneumonie" - Deut. med. Woch., 1890, 4), Kundrat ("Lungen-Abscess in Infl." - Wiener klin. Woch., 1890, 8) and Kahler ("Ueber schwere Lungen und Pleura Erkrank. bei der Infl." - Ibid., 1890, 9). The latter observer has reported the finding of pulmonary abscess coincident with empyema which proved fatal in four days, cultures of the streptococcus and the streptococcus being obtained from the pus.

Pleurisy without coexisting pneumonia appears to be a rare complication. It may, however, be found in association with pericarditis; and, in old persons especially, effusion may take place.

Herpes labialis is usually seen in these cases towards the end of the attack, and is regarded as a favourable sign by numerous observers.

Phthisis pulmonalis has been observed to complicate influenza, an attack of the latter, moreover, having the effect, as a rule, of causing the former to run a more rapid course than otherwise [Wiltshur ("Ueber den Einfluss der Grippe auf den Verlauf der Phthise" - Petersb. med. Woch., 1890, 5), Demuth ("Ueber Infl." - Verein. Pf. Aerzte, 1890, 2), Vogel ("Mitth. über bei Beziehungen der Infl zu den Athmungsorganen" - Mt. med. Woch., 1890, 399), and Sokolowsky (Schmidt's Jahr., 1890, 243)], whilst others [Heubner ("Discussion über Infl." - Ibid., 1890, 230), Strümpel ("Ueber Infl." - Mü. med. Woch., 1890, 6)] have observed phthisical patients with their pulmonary lesion uninfluenced, for better or for worse, by the influenzal attack.

#### H E A R T.

Affections of the heart seem to be rare complications of influenza. Thus, in the German army outbreak ("Die Grippe-epidem. im deutschen Heere, 1889-90; Bearbeit von der Med. - Abtheilung des K. Preuss., Krieg, Berlin, 1890), comprising over 55,000 sufferers, only four cases of endocarditis, and six of pericarditis were observed, one of the former proving fatal. A fatal result in both conditions has been reported by Fürbringer (loc. cit.), Tyson ("Epidemic Influenza



in Philadelphia" - Med. News, 1890, p. 133), Leichtenstern ("Mitth. über die Infl. in Köln" - Deut. med. Woch., May 29, 1890), and Neidhardt ("Die Infl. Epid. vom Winter 1889-90 im Grossherz. Hessen", Darmstadt, 2890); whilst a speedy recovery from the condition has four times been seen by Gordon Black ("The Influenza" - Lancet, Jan. 30, 1890), who considers endocarditis, in the course of influenza, to be "erythematous and evanescent" as compared with the "plastic" and more permanent lesion of rheumatic fever. Chiefly in persons with pre-existing cardiac disease, has Pawinski ("Ueber den Einfluss der Infl. auf das Herz" - Berl. klin. Woch., July 13 and 20, 1891) observed influenzal endocarditis, which he divides into grave and benign forms, according to the severity of the symptoms.

#### B L O O D - V E S S E L S.

As sequelae of influenza, thrombosis and embolism have been observed. A case of the former occurring in the left foot of an elderly male has been described by Duchesneau ("Sur la Gangrène des membres consécutive à l'Infl." - Gaz. Méd., 1890, 24), the limb having eventually to be amputated. Gangrene of the toes, in the case of a young woman of 24, has been reported by Hight ("Symmetrical Gangrene following Infl." - B. M. J., July, 18, 1890), the patient recovering after three weeks of suffering. The literature contains numerous other similar instances.

Intermittent œdema is one of the rarest complications of influenza. Krause (Cited by Althaus, "Influenza", 1892) describes having observed, in the left leg of a man, the condition, varying according to his mental state, and being, therefore, essentially of neurotic origin.

#### U R I N A R Y O R G A N S.

Persons subject to acute or chronic Bright's Disease are especially liable to the more serious manifestations of influenza, and such cases frequently terminate fatally. Cases of nephritis have frequently been reported, both simple and haemorrhagic (Sympson - "Acute Nephritis following Infl.", Lancet, May 10, 1890; Piggott - "Remarks on Infl. and its Complications", Ibid., Aug. 29, 1891; Fraser - "Infl. with Acute Nephritis", B. M. J., June 27, 1891; Weichselbaum - "Ueber Infl. und ihre Complic." Wiener med. Blatt., 1890, 3; Ribbert - "Anat. und Bakt. Beobach. über Infl.", Ibid., 1890, p. 105; Krehl - "Beobach. über Infl.", Ibid., 1890; Strumpell - "Ueber Infl.", Münch. med. Woch., 1890, 3; Anton - "Beobach. über Infl.", Ibid., 1890, p. 40; Drasche - "Ueber Infl.", Wi. med. Woch., 1890, 6, 17, 19, 21).

It is but seldom that one comes across a case of cystitis in influenza. Only once was it observed in the German army outbreak referred to; and a few others by Fiessinger ("Des Manifestations vésicales dans la Grippe", Paris, 1889), Fraenkel ("Discussion im Berliner Verein f. inn. Med.", Dec. 7, 1891), Widal (Art. "Grippe", Traité de Méd., vol. i, 1891, p. 824), and Frossat ("Troubles génitourin. causés par la Grippe", Lyon Méd., 1890, 13).

Vesical affections are not of common occurrence. Cases of

paralysis and atony of the bladder have, however, been reported. Thus, Brakenridge ("The Present Epidemic of So-called Influenza" - Edin Med. Jour., May, 1890) describes two instances, and Bilhaut (Bull. Soc. Thérap., 1890, p. 22) a case of retention of urine of a week's duration. Liégeois ("Parésie de la Vessie dans l'Infl." - Progr. Méd., Mar. 26, 1892), Michel (Sammlung auserlesener Abhandl., etc., vol. i, p. 14), and Saillant ("Tableau historique des Epidémies catarrhales" - Paris, 1870) record similar instances. Polyuria, anuria, Albuminuria phosphaturia, urobilinuria, and glycosuria, have sometimes been observed.

#### NERVOUS SYSTEM.

The severe and sometimes far-reaching effects of influenza upon the nervous system must be familiar to even the most inexperienced observer. A glance at any text-book, or treatise upon neurology, will convince anyone of the truth of this observation. It will here, therefore, be impossible, and quite unnecessary, to do more than give a general outline of the more common nervous manifestations of the disease.

The prostration of muscular strength is a very early symptom: the patient feeling very weak and exhausted, soon takes to his bed; and this initial debilitation may be taken as one of the most remarkable features of the influenzal attack, and continues, moreover, as a rule, far into convalescence.

Headache is a constant symptom; and severe pains about the forehead, the root of the nose, and orbits, are seldom absent. The pains are, moreover, sometimes referred to the cranial cavities lined by Schneiderian membrane, especially to the frontal sinuses, and sometimes also to the antrum of Highmore, the nasal ducts, and the middle ear. In some cases the whole head appears to be involved, or there is marked hyperaesthesia of the skin of the head and neck, as well as sometimes stiffness of the cervical muscles. The headache is frequently of the most intense and distressing character, and may even outlast the influenzal attack: it usually increases in severity with the fever, and especially towards evening. In many cases a smart epistaxis affords the patient some relief.

Together with a considerable amount of systemic depression, pains in the limbs are of regular occurrence: the writer has never yet seen an established case of influenza without them. Dull, tearing, and burning, pains are frequently experienced by the patient in particular muscles, tendons, or ligaments, or are perceived as generally diffused hyperaesthesia over the body as a whole. Patients complain particularly often of distressing pains, of a dragging or boring character, in the loins, calves, popliteal region, and the anterior aspect of the tibia; these, moreover, are neither relieved nor aggravated by gentle movement or moderate pressure. A sense of thoracic constriction and precordial distress is frequently complained of, and pleurodynia, substernal discomfort, and pains in the throat and nape of the neck are of common occurrence.

In addition to these phenomena, when the attack is severe, there

also occurs a greater intensity of the nervous manifestations. Patients are then apt to be unusually restless, sleepless, and anxious. Should they insist upon getting up, they frequently feel dizzy, and fainting fits are especially common in women. Mild delirium is by no means uncommon, and more intense forms have frequently been observed: in some of the older epidemics, active delirium was considered a mortal symptom. On the other hand, somnolent tendencies show themselves in certain epidemics, that of 1712 being a notable example, and in it the disease acquired the name of "sleeping sickness" from the frequency of this symptom. Insomnia bears no relation to the intensity of the attack: indeed, many cases in which it is a prominent symptom have been observed where the fever has been slight or absent.

In very severe, or grave, cases, there sometimes occur painful cramps in the calves of the legs, and twitchings of muscles, subsultus tendinum, and tremblings of the hands. In addition to this, the mental power is enfeebled, and acuteness of the special senses is diminished. The severity of the attack is, moreover, indicated by the change of expression of the countenance: such patients have a suffering, anxious, and depressed appearance, sometimes, indeed, like that noticed in the typhoid status.

The most frequent nervous concomitant of influenza is a perineuritis and this accounts for much of the patient's suffering. Delirium of the most active kind has been observed to complicate the disease, more especially when other complications - as pneumonia, and pericarditis - are present.

Cerebro-spinal meningitis is a rare accompaniment of the influenzal attack; less so, however, an actual cerebral meningitis, cases of which have been reported by Leichenstern (loc.cit), Maillart (*Étude clinique sur la Grippe pand.*, Geneva, 1891), Nicholson ("The Complications and Sequelæ of Influenza" - B. M. J., June 13, 1891), Fürbringer ("Purulent Meningitis" - loc.cit.), Hebblethwaite ("Tubercular Meningitis complicating Influenza" - Lancet, Dec. 12, 1891), Baumler ("Purulent Meningitis" - Deut. med. Woch., 1890, 2), Bristowe ("Cerebral Suppuration following Influenza" - B. M. J., July 4, 1891), Eichorst ("Meningitis and Effusion into the Ventricles" - Corresp. Blatt. f. Schweizer Ae., vol. xx, 1890), Leyden ("Purulent Meningitis" - Deut. med. Woch., 1890, 49), Kormann ("Purulent Meningitis" - Wi. med. Blatt., 1890, 51, 52). Ewald ("Purulent Meningitis" - Deut. med. Woch., Jan. 23, 1890), Sokolowski (loc.cit.), and many others.

Disseminated lesions of the spinal cord have also been reported.

#### I N F L U E N C E U P O N P R E G N A N C Y .

Pregnant women frequently suffer abortion when attacked by influenza, and the catamenia are sometimes established in those afflicted with amenorrhœa. Wet-nurses have been known to have metrorrhagia as an initial symptom of influenza, which latter, according to Anton (loc.cit., 1890, 31), and Evershed ("The Influenza Wave on Menstruating Women" - B. M. J., Mar. 1, 1890), is especially apt to be contracted at the time of the menstrual discharge.

M O R T A L I T Y   A N D   P R O G N O S I S .

According to the official Prussian reports (which may well receive attention at this juncture), the number of deaths from influenza in 1890 was 9,576; in 1891, 8,050; in 1892, 15,911; in 1893, 10,403; and in 1894, 7,336, and of these more than one-half were over sixty years of age. During the last fifteen years or so, the decrease of mortality from influenza has been remarkable, especially in cases attacked by tuberculosis. During the years 1890-94, however, there was a marked increase in the death-rate from bronchitis and pneumonia, due to an unusually severe epidemic.

Some idea of the morbidity and mortality of influenza during epidemic times can be derived also from the German army reports (Die Grippe-Epid. im deutschen Heere, 1889-90; Bearbeit. von der Med.-Abtheilung de K. Preuss. Kriegsministeriums, Berlin, 1890) of 1889-90. In all 52,263 cases were attacked; 54,805 (99.2 per cent.) were cured; 60 (0.1 per cent.) died; 174 (0.3 per cent.) were relieved. At the time of inditing the report (March, 1890), 224 (0.4 per cent.) were still under treatment for sequelae. The report of the Ministry of Marine comprises 447 cases, with only one death.

The length of treatment averaged 5.65 days at the latter part of the epidemic, but only 3.6 days at the commencement.

The duration of treatment in the cases included in Parson's official report on the London influenza epidemic of 1889-90 was longer:

<u>Service.</u>	<u>Duration of Disablement.</u>
Custom-house Officers .....	150 days per case.
Bank of England .....	9.4 " " "
London and Westminster Bank .....	9.4 " " "
Great Northern Railway (Traffic and Goods Department .....	7.0 " " "

In the German army epidemic referred to, 3.1 per cent. (1,735) of the cases were complicated by pneumonia, otitis, neuralgia, pleurisy, and tracheitis - in that order of frequency. Mortality was observed in:

- 31 cases of pneumonia.
- 1 case " gangrene of the lungs.
- 6 cases " pleuro-pneumonia.
- 2 " " pleurisy.
- 5 " " pulmonary tuberculosis.
- 1 case " " oedema.
- 1 " " bronchitis.
- 1 " " meningitis.
- 1 " " cerebral abscess.
- 2 cases of pericarditis.
- 1 case " endocarditis.
- 1 " " pericarditis and rheumatic fever.
- 2 cases of peritonitis.
- 1 case " septicæmia, following otitis media.
- 1 " " hepatitis.
- 1 " " enteritis.

- \* 1 case of typhoid fever
- 1 " " suicide during delirium.

\* Deducting the case of typhoid fever (the authenticity of which is vouched for by the historian of the epidemic), the death-rate was only 0.107 per cent.

Coming to civil populations, we find both morbidity and mortality considerably higher than in the army or navy. Leichtenstern ("Mitth. über Infl. in Köln" - Deut. med. Woch., May 29, 1890) states that 40 per cent. of those admitted to the Cologne Hospital suffered from complications or sequelæ, which compares very unfavourably with the 3.1 per cent. noted in the German army, as well as with the 1.1 per thousand reported during the same period in the English army.

The marked effect of an influenza epidemic upon the general mortality will be seen from the following tables for Paris and London:-

Deaths in Paris.

<u>Influenza Absent.</u>	<u>Deaths.</u>	<u>Influenza Epidemic.</u>	<u>Deaths.</u>
Third week of December, 1888 .....	982	Third week of December, 1889 .....	1,626
Fourth week of December, 1888 .....	955	Fourth week of December, 1889 .....	2,374
From December 30, to January 5, 1889 .....	<u>970</u>	From December 29, to January 4, 1890 .....	<u>2,683</u>
Total	<u>2,907</u>	Total	<u>6,683</u>

Deaths from Influenza in London, 1890.

Week ending January 4 .....	4	deaths.
" " " 11 .....	67	"
" " " 18 .....	127	"
" " " 25 .....	105	"
" " February 1 .....	75	"
" " " 8 .....	38	"
" " " 15 .....	30	"

Deaths from Influenza per Quarter in London, 1890.

First quarter of 1890 there were .....	558	deaths.
Second " " " " " .....	47	"
Third " " " " " .....	16	"
Fourth " " " " " .....	27	"

The excess of mortality produced by influenza, as regards the general mortality, amounted to:

In the week ending January 4, 1890 .....	423
" " " " " 11, " .....	810
" " " " " 18, " .....	765
" " " " " 25 " .....	<u>260</u>
Total	<u>2,258</u>

In other words, there were 2,258 deaths more than the average of the corresponding weeks in the preceding decade.

During the early part of 1890, the deaths from influenza in London were mainly from the following causes:

<u>Disease.</u>	<u>Number of Deaths.</u>
Bronchitis .....	911
Pneumonia .....	465
Pulmonary phthisis .....	337
Whooping-cough .....	64
Other diseases of the respiratory organs .....	78
Diseases of the heart .....	318
Alcoholism .....	49

Death seems to be somewhat rare in uncomplicated cases. Reports in the literature show a striking increase of fatal cases due to diseases of the respiratory organs. Persons at one or other extreme of life bear influenza very badly, especially the aged. Nevertheless, children in some epidemics have enjoyed a considerable proportionate immunity. As a rule, the disease is well borne by persons at a vigorous age. The course of influenza is unfavourably modified by certain pre-existing diseases, such as emphysema, chronic bronchitis, fatty heart, and Bright's disease. Influenza is in particular fatal from lung complications in persons debilitated by other, especially phthisical, disease: in children too, for the same reason, the disease is serious. Death takes place, in by far the greater number of cases, as a result of some complication, either by way of some pre-existing disease, arising in the course of the influenzal attack, particularly pneumonia. Apparently severe cases, however, gradually recover when they do not affect the young, the aged, the phthisical, or persons otherwise reduced.

The character of the prevailing epidemic, as a rule, considerably modifies the prognosis. In some epidemics, the deaths are few, and the mortality from other diseases does not appear to be greatly augmented. In others, many die during the prevalence of the disease, while the mortality from other ailments does not appear to be greatly augmented: the reverse also at times is true. The high mortality reported in some of the older epidemics is believed by most present-day writers to have been due to injudicious measures of treatment, especially blood-letting, and reducing therapeutic agents, such as mercury, which used to be much in vogue as a remedy for influenza, even to the extent of excessive salivation. Perhaps also, the reports in question included many cases of typhus. The proportion of fatal cases, moreover, varies in different countries, and even in different parts of the same city.

To sum up: Aside perhaps from the character of the epidemic and the complications, the prognosis depends upon the physical condition of those attacked - i. e., age, amount of strength to resist, and the existence of other diseases, are essentially decisive.

T R E A T M E N T .  
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P R O P H Y L A X I S .  
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At present we know of no means of securing to the individual an immunity against influenza. Immunizing experiments upon animals have not proved successful, and a satisfactory anti-influenzal serum for prophylactic and therapeutic purposes has yet to be produced. Unfavourable hygienic surroundings, overcrowding, a damp, unhealthy locality, appear to increase the prevalence and severity of influenza, but the opposite conditions of living do not, however, secure immunity from an attack. During an epidemic, aged persons, those reduced by chronic diseases, and in particular those subject to chronic bronchitis, pulmonary phthisis, emphysema, fatty heart, and Bright's disease, should be more than ordinarily cared for, since they constitute the classes most prone to the grave complications of the disease, and from which its fatal cases are almost wholly derived. Such individuals must be warmly clad; they should shun as far as possible, the vicissitudes of the weather, even, if practicable, keeping within warm and well-ventilated apartments; they should take particular care in dieting and lead a regular existence, and avoid fatigue of any kind. These measures, however, frequently fail to ward off an attack: persons remaining indoors, living in the greatest seclusion, even the bedridden, do not always, or perhaps even as a rule, escape. Yet it has been often observed that those whose occupations are carried on in the open air are attacked earliest and in the greatest numbers: this perhaps is due to the greater contact with infected persons of the individuals in question. Again, in rare instances, persons isolated from the community with strictness (prisons, hospitals, convents) have remained free from the disease prevailing around them. It appears, therefore, probable that, under favourable circumstances not as yet understood, the avoidance of the open air and of direct influences of the weather, may confer some degree of immunity from the attack, and it is desirable that the class of persons most liable to the graver consequences of the disease should avail themselves of even the most uncertain precautions.

Attempts have frequently been made to secure prophylaxis by medical measures. As the influenza bacillus has seemed to have invaded the system so often, by the mouth and nose, antiseptic irrigation of these cavities may prove serviceable. Gargles, containing such medicaments as menthol, oil of eucalyptus, creolin, quinine, oil of mint, and other ethereal oils, have been recommended for the above indication.

As in malaria, quinine has been given internally in the hope of being able to ward off an attack of influenza. Graeser (Vorschl. zur Verhütung der Infl., Berl. klin. Woch., 1899, 51) states that he has had a considerable satisfactory experience with quinine, used prophylactically, at the Polyklinik of Bonn. It was experimentally administered to the men of the second squadron of the King William I. Regiment of Prussian Hussars, stationed in that city. All the men

received eight and a half grains of quinine in half an ounce of whisky for a period of 22 days, with the result that 22 men became ill in the first squadron; 7 in the second; 19 in the third; 42 in the fourth; and 32 in the fifth. That the exhibition of the drug proved of prophylactic use was evidenced by the occurrence of only seven cases in the second squadron who alone received it.

#### T R E A T M E N T O F T H E A T T A C K .

The treatment of influenza must be of an expectant and supporting character, as the symptoms usually subside of their own accord in a few days - three, four, at most twelve. If prolonged beyond this period, it is nearly always due to some complication,

No matter how mild the attack, the patient should be kept indoors throughout the illness, and in the supine position, for two or three days.

The diet should be restricted to easily digested articles. Meat should be avoided. Even beef-tea is unsuitable owing to the headache and languor which it produces. Cold water may be taken in moderate quantities, or the aerated if preferred, and the fruit syrups, raspberry vinegar, a weak solution of citrate of potash or of cream of tartar, make an agreeable variation in the dietetic monotony. There can be no objection to giving weak wine-whey or Apollinaris-water, or equal parts of Seltzer-water and milk, with or without the addition of ice.

Stimulants should not be given unless specially indicated; and the amount of fluid exhibited in the twenty-four hours need not be of an unusual amount.

Quinine should be given from the outset, as it appears to have a decidedly favourable influence upon the course of the disease: according to the French writers, it has an abortive as well as a prophylactic action, more especially in the case of children. The writer has repeatedly satisfied himself as to its great utility, and has never yet found it to aggravate the headache, or to give the disappointing results described by certain German writers.

Dover's powder may be given at night, as some form of opiate is often required to counteract wakefulness. Certain cases bear Dover's powder badly, and to these may be given a pill composed of camphor (gr.ii), extract of opium (gr.ss.), and ammonium carbonate (gr.ii) instead.

The coryza, tonsillitis, laryngitis, and bronchitis, are to be treated on general principles.

Affections of the upper air-passages, and the tickling cough, call for inhalation of steam, and the confinement of the patient in an atmosphere rendered moist by the evaporation of water kept boiling in a broad, shallow, vessel. Gargles of chlorate of potash exert a soothing influence upon the congested tonsils.

More active treatment is required in severer cases, especially when the fever is high, and the congestion of the mucous surfaces is great. The patient must have supporting remedies; pain must be



relieved; sleep induced; and pulmonary congestion prevented. The latter is especially apt to occur in infants, the very old, and those persons debilitated from any cause.

The diet in these cases must be carefully regulated. The disinclination to take food is so great that it is often with difficulty that a sufficient quantity can be given in the early days if the attack, and it is doubtful whether benefit follows anything in excess of the most moderate amount. Food should be of the liquid kind (meat-extracts, milk, barley-water, and so forth) and be given in small quantities at short intervals, with unfailing regularity, according to the individual indication. As convalescence begins, the intervals between the meals should be longer, and the quantity of food given at each augmented.

Diaphoresis and diuresis can be promoted, and the thirst relieved, by the drinking of water or the beverages already alluded to. Diaphoretic drugs are much used upon the theory that by determination of the blood to the skin they correspondingly diminish the tendency to congestion of the affected mucous tracts. Dover's powder, solution of the acetate of ammonia, and other mild diaphoretics, may be used, but pilocarpine should be employed with great caution owing to its depressing effects upon the heart.

The wet pack, Turkish baths, and other hydrotherapeutic measures, have been employed to act upon the skin, and to effect a rapid reduction of the temperature, in influenza, but are not recognized as the best means to that end, as high temperature and headache are usually aggravated. Sponging with tepid or cool water seems in many instances to be beneficial. On no account may cold baths be employed. For old and feeble persons, warm packs may be tried, but it is usually believed that an indication for profuse sweating does not exist in influenza: moreover, sweating is not infrequently a very troublesome symptom of the disease, and in certain epidemics very markedly so.

Quinine is also serviceable in severe cases, and should be given early, and in full doses. It has in the writer's hands markedly reduced the temperature, allayed the tendency to local congestions, and relieved the nervous symptoms, particularly the headache. It is not now believed to be a specific for the disease.

Antipyrin, antifebrin, phenacetin, migrainin, salipyrin, and sodium salicylate, have been vaunted as specifics by various writers. That most, if not all of them, do good, especially antipyrin and salipyrin - judiciously exhibited - cannot be doubted. Besides reducing the temperature, and allaying the neuralgic pains, these drugs exert a powerful influence upon the nervous symptoms. The relief of the pains in the nerves, in and about the joints, bones, and muscles, is greatly appreciated by the patient. They seem, moreover, to markedly benefit some of the more grave symptoms, - even profuseness of sweating, - and are, therefore, regarded by many as specific. Even in aural and ocular affections, their efficacy has, in the writer's experience, been striking: he believes antifebrin to be the least serviceable of those named.

Salophen is regarded by certain writers as vastly superior to

salicylic acid and sodium salicylate. The writer has had reason to be satisfied with it in doses of 20 grains, increased to 1 or 1½ drachms a day, for adults, and 5 to 7 grains for children.

Purgatives are now no longer regarded as of first rank in the treatment of influenza. In cases of constipation, however, laxatives form a necessary part of the regimen. For this purpose an aperient mineral water (Friederichshalle, Hunyadi, Apenta, etc.) may be given. Castor oil is excellent in the case of children, but for adults calomel - in the absence of renal affection - is to be preferred - an enema of warm water, or of soap and water, may, of course, be tried instead. It is as well, however, to bear in mind the tendency in some cases to exhaustive and troublesome diarrhœa; and the fact that diarrhœa occurs spontaneously nearly always sometimes in the course of the disease, should inspire caution in the use of purgatives. The routine employment of measures of purgation during the course of the disease is positively injurious as well as useless.

The writer has found digitalis very useful in influenza, and is in the habit of giving it in the form of digitalin - 30 to 50 minims of a 1 : 1000 solution in the course of the day, at first, later smaller doses. Salicylate of bismuth, naphthol, salol, and benzonaphthol (one-twelfth of a grain in pill) are preferred by him, in cases of marked gastric and intestinal irritability, to all other preparations.

Some authors claim a specific action for benzol, in doses of 3 minims for children, or five minims for adults, continued for a few days after all symptoms of the disease have subsided. On theoretical grounds at least, it should prove beneficial.

Carbolic acid ( 2 minims of the B. P. liquid preparation three times a day) has been said to have a wonderful effect in contributing to the patient's comfort during the illness.

The bronchial symptoms and hacking cough, so often present at the outset of the disease, should be relieved. Rexpectorants, and even emetics, are of value. The writer lauds the exhibition of ipecacuanha and Dover's powder, but is not in favour of apomorphine, for the reason that he associates with it a marked tendency to produce heart-failure. Should the latter condition be observed, alcohol should at once be administered, or camphorate d oil injected hypodermically, followed by the usual cardiac stimulants.

Ammonium chloride is a useful drug for the relief of bronchitis; but antimonial preparations are inadmissible by reason of their tendency to depress the heart.

The distressing cough of influenza requires active treatment, as it rapidly exhausts the patient and contributes to the general prostration. Benefit will be derived from keeping the air of the sick-room moist, and from the occasional inhalation of steam from hot water, either used alone or poured upon the compound tincture of benzoin (one pint to the drachm), eucalyptus, or other approved volatile preparation, in a suitable inhaler. Opium, especially morphine and codeine, are particularly effective in meeting this indication: cough is relieved, headache and pains are allayed, and

refreshing sleep is induced. The writer has had no unfavourable results in the careful use of opium and its derivatives, and believes that that old-time dread of their exhibition has not always been well founded. The administration of opium in moderate doses he has frequently observed to be attended with advantages that far outweigh any danger of increasing the tightness of the chest and of retarding expectoration. It is, of course, necessary to observe the same caution in giving it to infants and aged persons in influenza that is necessary under other circumstances. Carbolic acid has been observed by the writer to meet the indication admirably.

Pain beneath the sternum and in the chest should be relieved with mustard plasters, turpentine stupes, belladonna liniment, etc. Pleurodynia can be benefitted in the same way, and is markedly relieved also - at least this has been the writer's experience - by strapping the affected side of the chest.

As influenza exerts such a depressing effect upon the aged, or persons otherwise debilitated, some form of stimulant is always indicated. Whisky, brandy, champagne, or ammonia, may be tried at any stage of the attack, but are nearly always required from the outset, the quantity being determined rather by the effect upon the circulation, and the general condition of the case, rather than by rule. Even those unaccustomed to the use of alcohol can often take spirituous liquors in large quantities without ill effect.

Chloral should never be used, unless specially indicated for hypnosis, owing to its depressing effect upon the heart. Even paraldehyde is sometimes inadmissible, or badly borne, and in these cases bromides, with or without opium, may be exhibited.

During convalescence it is very necessary that good nursing, a tonic treatment, and supporting dietary be secured, to counteract the debility which remains. Quinine and iron meet the former indication admirably and is effective in the removal of any neuralgia existing.

Convalescents must, for a lengthy period, be protected against the inclemencies of the weather, so as to prevent the occurrence of sequelae, from the irritability of the respiratory tract which remains.

The remnants of the attack require appropriate treatment on general principles.

A change to the country, seaside, or a health resort, is very often essential to a perfect recovery.

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**FINIS.**

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