

Now that a certain cure has been found, the recovery percentage should be nearly 100 per cent. I have personally given over 2,000 injections with a recovery rate of 67 per cent. in unselected cases, many having been extremely ill for some time before treatment was commenced, and a number refusing more than a few injections. These cases chiefly came to me from villages and were either Assamese or ex-garden coolies.

I append a statement from which some interesting points may be gathered. It will be observed that the disease nearly always declares

itself at the end of the rains or during the cold season, usually after the cold season has well set in. In the majority of cases it runs a prolonged course, and before treatment by tartar emetic intravenously was introduced by Rogers, the result was usually fatal. The death rate among my European cases was over 72 per cent., and this in spite of good nursing and careful treatment either out here or at home. No wonder the death rate among the coolie class should exceed 90 per cent. and kala-azar rightly considered a most malignant disease.

No.	Name.	Sex.	Age.	When attacked.	Duration of illness.	Result.	Length of residence before disease declared itself.
1	L. H. ...	F.	21	December, 1892 ...	Thirteen months ...	Death	... Born in Assam.
2	C. K. ...	M.	34	February, 1893 ...	Seven months ...	Death	... Born in India.
*3	C. W. ...	M.	35	December, 1893 ...	Ten months ...	Death	... Two years in Nowgong District.
*4	F. W. ...	Boy	7	January, 1894 ...	Eight months ...	Death	... Two years in Nowgong District.
5	W. F. ...	M.	27	August, 1897 ...	One year ...	Recovery	... Ten months in Nowgong District.
6	W. C. ...	M.	25	December, 1897 ...	Three and a half... months	Death	... Eight months in Nowgong District.
7	G. D. M.	M.	28	December, 1898 ...	Nine months ...	Recovery	... Two years in Nowgong District.
8	G. L. D. ...	M.	23	February, 1900 ...	Very prolonged	Died of bronchitis	Eighteen months in Nowgong District.
9	H. G. W.	M.	30	December, 1900...	Ten months ..	Death	... Three years in Nowgong District.
10	H. O. A. O.	M.	37	September, 1909...	Six months ...	Death	... Eight years in Nowgong District.
11	F. H. F. ...	M.	32	September, 1914...	Twelve months ...	Recovery	... Seven years in Nowgong District.
12	A. H. W. T.	M.	30	September, 1919...	Actually ill for one month.†	Cured	... Three years in Nowgong District.

\* Nos. 3 and 4 are father and son.

† Recovery in 2½ months.

### INFLUENZA AS OBSERVED IN THE SAMBHU NATH PUNDIT HOSPITAL, CALCUTTA.

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THE object of this paper is to record facts observed in influenza cases admitted into the Sambhu Nath Pundit Hospital, Calcutta, in the course of hospital work during the last epidemics which visited Calcutta in quick succession. It does not profess to deal with the subject exhaustively, but to place before the readers matters that proved of general, clinical, bacteriological, diagnostic and therapeutic interest.

#### INTRODUCTORY.

Since June, 1918, influenza appeared in Calcutta three times in epidemic form. The first attack was in June 1918, and lasted till the end of July; the cases ran a rapid course. The second attack followed in October, 1918, and persisted till January, 1919, and was fulminating in type. The third invasion in May,

1919, has been a mild one and is pursuing a chronic course. At the time of writing this paper there appears to be an exacerbation of the disease from the number of admission of fresh influenza cases into the hospital, and I am afraid lest there should be another invasion of influenza in an epidemic form. The havoc it caused in Calcutta can easily be judged from the fact that out of 710 cases of influenza admitted in the hospital during the first two epidemics of 1918 for treatment, 214 died.

#### PECULIARITIES OF THE DISEASE.

It was a pandemic disease, which spread with remarkable rapidity and attacked a large number of inhabitants. The onset was quite abrupt. One attack conferred no immunity from a second. Relapses were frequent. The disease was no respecter of person, sex or position. Neither sanitary conditions nor seasonal variations had any influence. A certain characteristic was observed as regards the age of the patient. People between 15 and 35 years of age suffered most, but the majority of sufferers were between

10 and 40, while cases above 50 and below 10 were comparatively few. All the different grades of society were attacked, but the poorer classes suffered most. It was highly infectious, and travelled from one place to another very quickly. The line of propagation of the disease was observed chiefly along the main routes of communication, such as the railway, postal and steamer services. In short, it spread through human intercourse and infected fomites. It proved fatal through its numerous and serious complications which developed frequently, otherwise it was trivial and the patient recovered in the course of a week. People undergoing treatment by quinine, arsenic and salvarsan did not escape the disease.

#### CLINICAL TYPES OF CASES.

During the epidemic of June-July 1918, roughly speaking, two types of the disease were seen in the hospital, *e.g.*, (1) Simple, which predominated at the beginning, and (2) Pulmonary or pneumonic, manifested at the end of the epidemic, which had a tendency to transmit itself as pneumonic from the onset. But in the course of the other two epidemics two more varieties were noticed, (3) Irregular, which started with the symptoms of a simple type but ran a protracted course lasting from two to four weeks. The fever was markedly remittent or intermittent, thus simulating typhoid or malarial fever, and lastly, (4) A nervous type, which resembled meningitis. In addition to the above, a few gastro-intestinal and cardiac types were observed, but they were few in number. The above classification was based on the predominant symptoms present in cases.

During the first half of the first epidemic, nearly all the cases were of the simple type, but in the last half, 50 per cent. of the cases were of the pulmonary type. In the second epidemic, 70 per cent. of cases were pulmonary, 15 per cent. irregular, and 15 per cent. nervous in type.

#### CLINICAL SYMPTOMS AND PECULIARITIES.

1. *Simple type of disease.*—It sets in abruptly with a catarrhal condition of the upper part of the respiratory passage, *i.e.*, running of the nose and soreness of the throat, attended by severe headache, pain all over the body, fever rising up to 102 or 103 degrees F., and general malaise. Bronchitis is usually absent. Recovery is the rule and takes place in 3 to 6 days. The bodily pain is so marked that it may be mistaken for dengue.

2. *Pulmonary or Pneumonic type.*—The catarrhal condition of the respiratory passage is marked. Bronchitis occurs, temperature rising up to 104 or 105 degrees F. in the course of a few hours, ushered in by chills, though not necessarily amounting to rigor. There is malaise, pain all over the body, much prostration and delirium. Pneumonia of both sides, generally lobular and in exceptional cases lobar, soon supervenes. The sputum is slightly bluish in colour, and is brought out in coin-like lumps. The pulse is of

low tension, soft and compressible. Temporary nephritis with the passage of a large quantity of albumen and numerous casts and marked retention of chlorides invariably develops with the onset of the disease, but without any puffiness of the eyelids or oedema of the body. The aspect of the patient is characteristic—the face is flushed, sordes collect on the teeth, the patient lies in a prostrated condition and shows signs of distress and dyspnoea. Intense and general toxæmia supervenes and is out of proportion to the symptoms present. Cough is a very troublesome symptom and difficult to treat. The pulse respiration ratio is not altered to two to one as in pneumonia. The breathing is shallow and laboured. The physical signs in the chest are not characteristic of either pneumonia or broncho-pneumonia, but are of a vague and indefinite nature; even in an advanced stage only numerous râles and rhonchi are found and nothing else. There is a great tendency to develop numerous complications. In certain cases delirium persists even when there is no fever. The blood examination shows leucopenia, and even where lobar pneumonia is present (which is very exceptional), the total leucocyte count never exceeds 12,500 per c.m.m. Favourable cases take about three weeks to recover.

3. *Irregular type.*—It starts with symptoms of the simple type of the disease, but bronchitis is always present and runs a protracted course, lasting from two to four weeks. Localised and scattered broncho-pneumonia develops gradually. The fever is very variable not only in degree but also in type; sometimes markedly intermittent or remittent, with chills thus simulating malaria or typhoid fever. The pulse is soft and compressible. The urine is albuminous, with marked diminution of chlorides. Few complications are met with. Cases usually recover. Quinine has no effect in such cases.

4. *Nervous type.*—All the symptoms of the pneumonia type, with marked nervous trouble simulating meningitis, are present. Many cases of this and the pneumonic variety present a septicæmic condition and run a galloping course.

#### DIFFERENTIAL DIAGNOSIS.

<i>Simple type of Influenza.</i>		<i>Dengue.</i>
(1) Pandemic ...	...	Epidemic.
(2) Temperature Chart—Irregular.		Saddle back.
(3) Rash—Absent ...	...	Always present.
(4) Predominant symptom—Catarrh of respiratory passage.		Pain.
(5) Blood—Nothing abnormal		Leucopenia with Eosinophilia.
<i>Influenzal Pneumonia.</i>		<i>Ordinary Pneumonia.</i>
(1) Type—Broncho-pneumonic		Lobar.
(2) Pneumonic symptoms—Absent.		Prominent.
(3) Temperature shows—Lysis		Crisis.
(4) Pulse—is always of low tension.		Not so.
(5) The blood examination shows leucopenia, and even where pneumonia developed the total leucocyte count never exceeded 12,500 per c.m.m.		Marked leucocytosis and count exceeds 20,000 per c.m.m.

*Influenzal Pneumonia.*

(6) Temporary acute nephritis with the passage of a large quantity of albumen, numerous casts and marked retention of chlorides invariably develops with the onset of the disease.

*Ordinary Pneumonia.*

Very rare, but slight albuminuria and retention of chlorides develop in course of the disease.

## PROGNOSIS.

*Depends on types of cases.*—It is good in simple, uncertain in irregular, and very bad in pneumonic and nervous types of cases. Also varies according to the age and condition of the patient. In children under 10 years of age and old people is not unfavourable; in debilitated persons suffering from malaria, tuberculosis, alcoholism, renal and cardiac troubles—worst; in adults between 15 and 35—very grave. Pregnant women stand the disease badly.

## DIAGNOSIS.

There is one cardinal point in recognising the disease at its onset. The method is simple and rapidly reveals the true nature of the disease. It is followed as a routine practice in the hospital but can easily be done in private cases. All the cases, excepting the mild or simple ones, develop acute broncho-pneumonia either localised or generalised, and this may not be made out in the first few days of the illness by physical examination. But the examination of urine gives us a definite clue. The amount of chlorides passed in the urine of the patient is the best evidence of the existence of the disease. A marked diminution of chlorides is found as early as the second day of the disease, even when the symptoms are not fully developed. Copious albumen, with numerous epithelial and granular casts and red blood corpuscles, is also present. But the most important and constant factor is the great diminution of chlorides which may vary from  $1\frac{1}{3}$  to  $1\frac{1}{10}$  of the normal quantity. Normally chloride is estimated at 1 per cent. The test can be conducted at the bedside of a patient. Only two test tubes and a 3 per cent. solution of silver nitrate are necessary for estimating the chlorides roughly. Put in one test tube one-third ounce of urine of the patient and in another (the same) quantity of silver solution. Pour the solution drop by drop into the urine until the whole of it becomes milky. Normally the whole quantity of silver solution is taken up, whereas in influenza cases about a third to one-tenth of the solution is required. Roughly speaking, if one-third or one-fifth of the solution is required, the amount of chlorides in the patient's urine is one-third or one-fifth of the normal quantity. I have mentioned this point first on account of its great diagnostic value. Apart from this, the typical clinical symptoms and peculiarities, *e.g.*, the soft and low tension pulse, temporary nephritis without any puffiness of the eyelids, the prostration and general toxæmia out of proportion to the existing symptoms, the indefinite physical signs of the chest, the blood examination showing leucopenia, the liability to numerous com-

plications, and the prevailing epidemic help to diagnose the disease.

## COMPLICATIONS.

They are too numerous to mention. Hyperpyrexia, delirium, broncho-pneumonia, pneumonia, pleurisy, pericarditis, asthenia, enteritis, meningitis, uræmia, otitis media, neuritis, hæmoptysis, epistaxis, hæmatemesis, hæmaturia, melaena, menorrhagia, abortion in pregnant women are very common. Persistent vomiting, arthritis, parotitis and mastoid abscess are not uncommon.

## SEQUELÆ OF THE DISEASE.

General debility and marked prostration, chronic bronchitis, pulmonary phthisis, gangrene of the lungs, empyema, palpitation on slight exertion, abscess in the antrum of Highmore, pyæmia, otorrhœa and furunculosis. In one case myelitis followed the disease.

## MORTALITY.

During the two epidemics of 1918, the total number of influenza cases admitted into the Sambhu Nath Pundit Hospital was 710 out of which 214 died. The average mortality was 30.3 per cent. Simple types of cases numbered 257, with no death. Pneumonic and nervous types amounted to 208, of which 156 died, the death rate was 75 per cent. The mortality from 245 irregular type of cases was 58 or 23.6 per cent.

## BACTERIOLOGY AND PATHOLOGY.

Pfeiffer's influenza bacillus is generally taken to be the infective organism, but during the epidemic the isolation and cultivation of the germ was a matter of great difficulty. I failed to detect the bacillus in the nasal secretion, sputum, blood, urine, stool, cerebrospinal fluid and pleural effusion of patients suffering from the disease. The majority of cases showed streptococcal infection. Otherwise a mixed infection of staphylococcus, streptococcus, pneumococcus and micrococcus catarrhalis was obtained generally. But while making post-mortem examinations on the pneumonic type of influenza cases within two or three hours of death I found the various recesses communicating with the nasal cavity such as the antrum of Highmore, frontal and ethmoidal sinuses and the mastoid antrums filled with Pfeiffer's bacilli. The only peculiarity was lumps embedded in it. The lumps on examination were found to consist of pure growth of bacilli which in microscopical, morphological, staining and cultural characters were identical with Pfeiffer's bacilli. The only peculiarity was that the bacilli grew well in all media at first, probably on account of the presence of the mucoid and albuminous substance in which they were embedded, but on subculturing grew in blood agar only.

The pathological condition of the internal organs presented the usual appearance described in text books. The noticeable features were that the lungs never showed pneumonic

consolidation—hence the term influenzal pneumonia is bad—and the kidneys presented an acute nephritic condition. The sinuses and antrums were filled with mucoid substance, but were not so in other diseases.

#### PROPHYLAXIS.

Inhalation of eucalyptus oil and internal administration of two or three drops of it with sugar, twice or thrice a day, proved a valuable personal prophylactic treatment. But the want of a definite means of treatment such as quinine in malaria or diphtheria antitoxic serum in diphtheria, the easy communicability of the disease and the short incubation period make general prophylactic treatment almost impossible. Segregation is not an absolute protection against the disease.

#### TREATMENT.

Rest in bed was strictly enjoined in all types of the disease from the very beginning. Cases of sudden death occurred on the patients getting up from the bed. Regarding medicinal treatment one thing was kept in view in the hospital. A general and profound toxæmia more or less supervened in all the cases, so alkaline treatment was freely resorted to to combat it. Elimination of the toxin was augmented by the use of diuretics and diaphoretics. Stimulants such as digitalis, strychnine, solution of adrenalin chloride, atropine and spirit vinum gallici were largely used to overcome the concomitant depression. Alkaline treatment combined with diuretics, diaphoretics and stimulants was found to be very useful. Complications and other troubles were treated symptomatically. Depressants and sedatives, *e.g.*, bromides, antipyrin, aspirin and salicylates were as a rule avoided, as they caused more harm than good. The following prescription was used in the Sambhu Nath Pundit Hospital with marked success:—

Sodii bicarb.	..	..	g. xv.
Sodii citras	..	..	g. x.
Sodii benzoas	..	..	g. x.
Liqr. ammon. citras	..	..	ʒij.
Spt. ammon. aromat.	..	..	m. xv.
Tinct. digitalis	..	..	m. v.
Syrup tolu	..	..	z. p.
Aqua	..	..	ad ʒi.

To be taken every four hours in the case of an adult.

In many cases sodii bicarb. 30 grains with sodi citras 15 grains dissolved in 20 c.c. of sterilised water was injected intravenously daily or on alternate days according to the condition of the patient with excellent result.

*Vaccine treatment.*—Cases were treated with stock or autogenous vaccines combined with alkaline treatment. The result was on the whole satisfactory. The vaccines were employed cautiously and discriminately but never enthusiastically. Purely vaccine treatment could not be relied upon.

*Diet.*—Plain liquid diet was given. Meat broth or soup was avoided on account of the

general kidney trouble. Ordinary water with sodii bicarb. ( $\frac{1}{2}$  per cent. solution) was freely used as a drink.

In conclusion my best thanks are due to Lt.-Colonel E. A. W. Hall, I.M.S., the Surgeon Superintendent and the staff of the hospital, and to Lieut.-Colonel E. H. Brown, I.M.S. (retired), who was Surgeon Superintendent during the first epidemic, for their kind help.

### THE WORK OF A VACCINE DEPOT, MEIKTILA.

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I HAVE often felt the desirability of a greater knowledge of the methods in use in the various vaccine depôts throughout India, together with their past experience and future aims in the production of vaccine lymph. At present, as in the past, we work in more or less watertight compartments, knowing little or nothing of each other's doings, except such as can be gleaned from the published annual vaccination reports. But the space at the disposal of the authors of these reports precludes anything but a very brief account of the work carried on in the various depôts.

This state of affairs does not make for progress, and I have more than once put forward the suggestion that the annual reports of the various depôts should be printed and bound in one blue book for distribution amongst those interested in the production of vaccine lymph. I think that nothing but good would result from this interchange of ideas, and hope that some time in the future the suggestion will be adopted.

What follows is a brief account of the history of the vaccine depôt, Meiktila, culled from its annual reports, and from my own notes, for I held the post of Director for, in all, 7 years out of the 18 it has been in existence.

Prior to 1902 the lymph supply of this province was exceedingly unsatisfactory. Some was obtained from India, some from small badly equipped local municipal depôts at Rangoon, Mandalay, Moulmein and other places, and from a small, more or less experimental Government depôt, located first at Taunggyi in the Shan Hills, and afterwards at Rangoon.

The Meiktila depôt began in a very modest way in a hired mat bungalow in 1902, but the following year moved into more suitable quarters, consisting of a brick building divided into a couple of rooms, one for operating, the other for mixing, loading, and packing the lymph. Quarters for the staff and stables for the calves were also provided.

From time to time small additions and extensions were made, and finally an entirely new building was erected with lofty, well ventilated, well lighted laboratories, offices, and store rooms. It was intended that the institution should be equipped not only as a vaccine depôt but as a public health laboratory, all under a Deputy