were packed with gamgee tissue and towels, some tightly, others loosely, and among the contents of each drum one or more of the control tubes were enclosed. Beside each control tube was placed a small glass tube containing a sporing broth culture of *Bacillus subtilis*. The drums were treated at various pressures for different times in a pressure steam sterilizer and then opened. The control tubes were matched against a colour scale prepared from tubes heated at 239° F. for known times, and the culture tubes were opened under aseptic conditions and subcultured to test for sterility. In all, 47 comparisons were carried out, the results of which are summarized in Table I.

TABLE I.

Group.	Number of Tests.	Subculture Results.	
		Sterile.	Growth of B. subtilis.
A. Colour of control tube indicates exposure to 239° F. of 20 minutes or more	24	23	1 (?)
B. Colour of control tube indicates exposure to 239° F. of between 10 and 20 minutes	9	7	2
C. Colour of control tube indicates exposure to 239° F. of less than 10 minutes	14	0	14

It was therefore concluded that when the colour of a control tube enclosed in a package of dressings corresponded with exposure to 239° F. for not less than twenty minutes, the material had been efficiently sterilized, whilst a lighter colour indicated at best doubtful efficiency.

Factors Influencing the Penetration of Steam into Dressings.

A few preliminary tests showed that under ordinary conditions steam frequently fails to penetrate to the centre of a drum of dressings even when these are not very tightly packed. This observation has recently been confirmed by Black.[1]

Experiments were accordingly carried out to determine the factors influencing the penetration of the steam through the dressings. It was found that the tightness of packing was one of the most important. How tightly a drum may be packed with safety depends on various considerations, such as size of the drum, the degree of evacuation attainable, the nature of the material to be sterilized, and the pressure of steam and duration of heating which can be employed without damaging the outer layers of dressings. Efficiency can only be attained by trial in each case, but the following experiment illustrates the bad effect of packing too tightly.

Experiment on Packing.

Three metal drums, each 11 by 9 by 9 inches, were packed evenly with gamgee tissue. The drum which was most tightly packed contained roughly twice as much as that most loosely packed. Control tubes were placed in each drum in the positions indicated in the table and in some cases were accompanied by small maximum thermometers. A control tube and thermometer were also placed unprotected inside the sterilizer to afford a check on the conditions outside the drums. All three drums were sterilized simultaneously. The sterilizer was first evacuated to a negative pressure of 10 inches of mercury, and steam was then admitted. The process was completed by drying in a current of hot air for one hour. The results obtained are shown in Table II, the control tube readings being expressed as number of minutes' exposure to 239° F.

It will be seen that whilst it was possible to obtain adequate penetration of the steam even into the most tightly packed drum, the length of time necessary to produce efficient sterilization in this case was so long that the outer layers of material would soon be damaged by repeated treatments. Similar experiments with linen towels and cotton abdominal sheets yielded completely analogous results.

Comparison of Drums and Bags.

Experiment showed that, within the limits found in the types of drum commonly used, variation in the area of the holes for the entrance of steam made little difference to the penetration. When, however, the dressings were enclosed in a hessian bag of similar size and shape to the drum,

TABLE II.

Drum and Weight of Contents.	Position of Control Tube and Thermometer.	Heating 1. 20 mins. at 15 lb.		Heating 2. 20 mins. at 20 lb.		Heating 3 1 hour at 20 lb.	
		Max. Temp.	Tube Reading (mins.).	Max. Temp.	Tube Reading (mins.).	Max. Temp.	Tube Reading (mins.).
		°F.		°F.		°F.	
A.—1 lb. 12 oz.	1. Middle of drum one-third way up	235	10	246	10		
	2. Middle of drum two-thirds way up	243	20	243	10		
	3. Edge of drum against holes at side	—	20	—	30+		
B.—2 lb. 10 oz.	4. Middle of drum one-third way up	178	2	199	6		
	5. Middle of drum two-thirds way up	204	4	205	8		
	6. Edge of drum against holes at side	—	30+	—	30+		
C.—4 lb.	7. Middle of drum one-third way up	176	2	181	4	266	30+
	8. Middle of drum two-thirds way up	176	4	187	4	261	30+
	9. Edge of drum against holes at side	—	30	—	30+	—	—
Control	Uncovered in sterilizer	246	30	257	30+	263	30+

the increased area available for the entrance of the steam resulted in greatly increased penetration. There can be no doubt that, whatever the disadvantage of bags for storage purposes, they are much more efficient than metal drums for the actual sterilizing process.

Conclusions.

To ensure efficient sterilization it is necessary that the articles be packed loosely in bags or in adequately perforated drums. The pressure of steam and time of sterilization must be adjusted according to the material being treated so as to ensure complete penetration without damage to the goods.

Satisfactory control of the process can best be assured by placing in the centre of the materials an indicator such as that described, the changes in which depend both on temperature attained and the duration of exposure to that temperature.

We desire to express our thanks to Miss C. D. Tingle, M.B., Ch.B., who kindly conducted all the bacteriological examinations.

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A CLINICAL STUDY OF ENCEPHALITIS LETHARGICA,

BASED ON SIXTY-TWO CASES.*

BY

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THE present outbreak of encephalitis lethargica was admirably described by Von Economo[1] in May, 1917, in a classical description in which somnolence, ophthalmoplegia, and profound asthenia are given as diagnostic criteria. It must not, however, be forgotten that even in April, 1917, Cruchet, Montier, and Calmette recorded a series of 40 cases of "subacute encephalo-myelitis" before the Société Médicale des Hôpitaux de Paris[2]; these cases had occurred in the winters of 1915-16 and 1916-17. Thus the disease was recorded in France and Austria almost at the same moment.

Dr. Crookshank[3] traces the disease back to the time of Hippocrates, and shows that during the last 450 years there have been a number of epidemics in various countries of Europe. It is worthy of note that during the twenty or

* A paper recently read before the Liverpool Medical Institution.

thirty years prior to 1917 several isolated cases of encephalitis had been described, but their significance was not detected at the time.[4]

The epidemic nature of encephalitis lethargica indicates that the disease is due to a specific organism. The work of Loewe and Strauss, confirmed by Thalhimer, Levaditi, Harvier, McIntosh, Turnbull, Ottolenghi, D'Antona, Tonietti, and others, merits the highest commendation of having established the closest relationship between organism and disease.[5] The two first claim to have discovered the specific organism. Crookshank and other authorities have drawn attention to the relation of outbreaks of encephalitis with epidemics of influenza. I would suggest that the obscure conditions which favour an epidemic of one disease may at times also favour the outbreak of the other. It remains for the bacteriologists to complete the separation of the two diseases.

FIG. 1.—Case 47.

Clinically, it is to be noted that the headache of influenza is usually frontal, whereas that of encephalitis is not uncommonly occipital. Moreover, not infrequently the feverish commencement of a case of this complaint may be labelled influenza—especially if the two diseases are coincident. Undoubtedly the majority of the cases of encephalitis on which this paper is based have occurred when influenza has been conspicuous by its absence, and in none of them has a history of true influenza in the individual or his family been proved. It appears to me that the headache of influenza may be a form of influenzal encephalitis.

The infectivity of the disease is apparently very low, but, as Dr. Stallybrass[6] has recorded, a few instances of severe infection have occurred in institutions, and, as he says, "pointed to the possibilities of the disease." During this year I have seen four instances of more than one patient in a family affected with the disease:

A young married woman was suffering from a severe form of the hyperkinetic variety; her mother complained of headache, lethargy, and weakness, accompanied by nystagmus, tremor, and paresis in the right hand; and the grandmother had headache, lethargy, nystagmus, and ptosis.

A schoolboy, aged 12, developed an acute pharyngitis, headache, and fever, followed shortly by sleepiness and delirium, when ptosis, squint, and nystagmus became evident. A few days later his mother became ill with headache, drowsiness, delirium, and nystagmus.

A man and his stepson in one house, and two women and a baby in another, were affected about the same time.

Five of these cases, though showing quite definite symptoms, were mild, and should be classed in the abortive group. They occurred in Dr. McNeil's practice. It is probable that many people suffering from the abortive type exist, but are not detected.

Most authorities think that the mode of entry of the organism is by one or other mucous membrane, most probably the mucosa of the naso-pharynx as demonstrated by Strauss. In many of my cases severe pharyngitis has been found. In one patient acute rhinitis with haemorrhage, in another severe stomatitis, in a third intense conjunctivitis, and in four diarrhoea occurred at the commencement of the illness.

Moreover, the various cases can generally be separated into an acute, subacute, or chronic variety of the disease. The acute and subacute varieties are in the great preponderance of cases that interest us here, but three at least may be classified as chronic. Wimmer has just published an interesting monograph[7] on chronic epidemic encephalitis, in which he truly says that "the cases may be and often are of a chronic and insidious nature from the very beginning." In other words, chronic encephalitis may be said to be an encephalitis with non-febrile course. There is no doubt that we are now meeting with patients whose illness begins with a gradual and insidious onset, in which there is no history of fever, and which appear to be very chronic in type. Such is case No. 50, who states that her condition began gradually, without any fever for several months, and that she has been ill for two or more years. At what date an acute or subacute case with prolonged symptoms should be called chronic is sure to be a debatable question.

There seems to be no discrimination between the sexes: in these cases there have been 26 males and 36 females. The annual incidence of these patients is:

Annual Incidence.

Year.	Cases.	Year.	Cases.
1919	2	1922	3
1920	1	1923	13
1921	2	1924	41

It is considered that after adult life is reached there is a diminishing liability to infection. The age incidence of these cases according to decades illustrates this pretty clearly, but at the same time it also strongly demonstrates that no age is immune: the youngest patient was 14 months, and the oldest 82 years of age.

Age Incidence in Decades.

Age.	Cases.	Age.	Cases.
0-10	4	50-60	9
10-20	15	60-70	4
20-30	14	70-80	1
30-40	7	80	1
40-50	7		

The mode of onset is very variable: frequently it is *sudden*.

For instance, Case 37 was struck down with headache and giddiness whilst riding a bicycle, and was found lying by the roadside in a collapsed condition. He was found to be suffering from stupor, delirium, and pyrexia. Another case, No. 61, complained of headache, went off to sleep at her work, and could not keep awake when roused. A third case, No. 18, after previous headache, became suddenly semi-conscious and appeared to be suffering from apoplexy, until it was found that he could be roused and move his limbs. Case No. 13, a woman aged 19, returned home from work and suddenly developed twitching of the legs, followed a day or two later by twitching of the arms, delirium, sleeplessness, and restlessness. In fact, she was an example of the severe hyperkinetic group. The sudden onset of two ataxic cases is mentioned later.

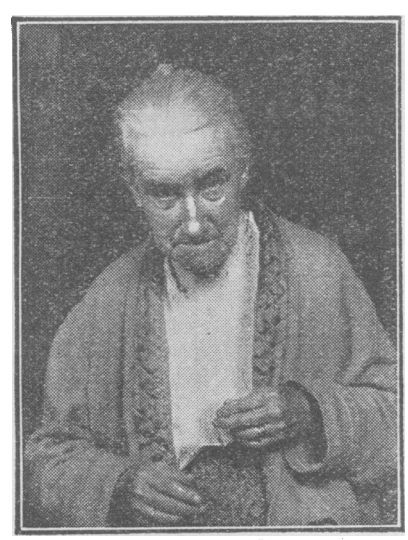

FIG. 2.—Case 50.

Other cases begin with fever, headache, and drowsiness. Thus, of 62 cases, 27 give a history of *sudden* onset; 15 an onset which could be described as *quick* (within eight days); and in 20 cases the onset was over eight days, and they are therefore classified as *gradual*.

Case No. 47, a woman aged 21, who had marked Parkinsonian syndrome with monotonous voice, twitching of the limbs, and tremor of the tongue, gave a history of gradual onset of many months' duration (Fig. 1).

Case No. 48, a well developed girl aged 15½, complained of sore throat, feverishness, and depression for three weeks before the definite acute symptoms showed themselves.

Case No. 50, a woman aged 67, stated that her condition of lethargy, nystagmus, partial ptosis, Parkinsonian syndrome, and rigidity had taken months to develop (Fig. 2).

It is extremely difficult to classify the cases of encephalitis lethargica into different groups or types. The classification given by the American Association of Research appeals to me as best covering the ground, therefore I adopt it.

Clinical Types.

I. Somnolent-ophthalmoplegic type (febrile or afebrile).
II. The paralytic (akinetic or hypokinetic) type.
III. The amyostatic type (Parkinson-like and cataleptic syndromes).
IV. The hyperkinetic type (myoclonic, choreic, and epileptic forms).

V. The psychotic type (delirious, maniacal, and depressive forms).
VI. The hyperalgesic type (painful forms).
VII. The tabetic type (Argyll Robertson pupils with loss of deep reflexes and sometimes with lancinating pains).
VIII. The ataxic type.
IX. The abortive type (formes frustes: imperfect, rudimentary, and ambulatory forms).
X. The aberrant type (intestinal, cutaneous, vagal forms, etc.).

Even with that grouping it is noted that individual cases may belong to two groups, either at the same time or at different periods of illness. Thus, Case 14 belonged to the hyperkinetic and ataxic groups, and Case 16 at one time to the hyperkinetic and later on to the amyostatic group.

The most common type of case has been a combination of the somnolent-ophthalmic and amyostatic types—namely, patients who suffered from lethargy or stupor, external ophthalmoplegia (of which nystagmus, ptosis, squint, and diplopia were evidence, the frequency being in the order in which they have been named), and who had the Parkinsonian syndrome more or less marked, but without tremor. Delirium in a greater or lesser degree was a noticeable feature in many of these cases. In three instances the patients were sleepless and restless at night and drowsy during the day. This condition is more frequently found in children, as in a boy aged 8—Case 54 (Fig. 3). Internal ophthalmoplegia is also sometimes present, and was the only ocular disturbance in Case 61.

One patient, Case 16, was choreic, restless, and sleepless for one week, and then changed into the type mentioned above; in the first stage her reflexes were exaggerated, and in the later stage they were diminished. Case 53 was the reverse type, as he was at first somnolent and later hyperkinetic.

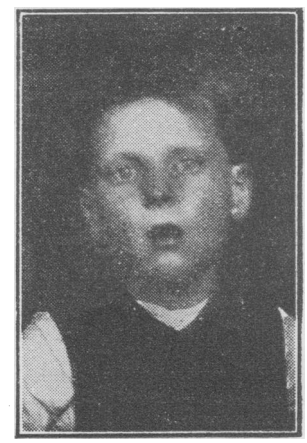

FIG. 3.—Case 54.

Of the 62 cases, the first two, middle-aged men, were affected in 1919. Both were a combination of the paralytic and amyostatic types with Parkinson's syndrome (*minus* athetosis) and had cataleptic stupor well marked. Ptosis, nystagmus, and some squint with sluggish knee-jerks confirmed the diagnosis. Both patients dropped off to sleep during the examination, and showed no interest beyond asking in a monotonous whisper if they would recover. A similar case (No. 12), also a male, aged 51, was an in-patient in my wards in 1923. He lay in a deep stupor—almost coma—just swallowing liquids for several weeks, with expressionless face, dropped jaw, double ptosis, and paralysis of the left external rectus.

One other such case should be mentioned, an old gentleman aged 68 (Case 18), who had small pupils, marked ptosis, nystagmus, and lay in a cataleptic stupor from which he could only be roused by shouting. His temperature was 102°, and he gradually passed into deep coma and died. (Dr. Robertson Dunn's patient.)

Early in 1923 Group IV, the hyperkinetic type of case, became evident, in which severe restlessness, insomnia, choreic movements, rhythmical twitchings of muscles and of the limbs, were pronounced symptoms. Of 17 such patients, 3 showed marked dyspnoea. One (Case 13) had respirations of 70 to 80 a minute for eleven weeks, and another

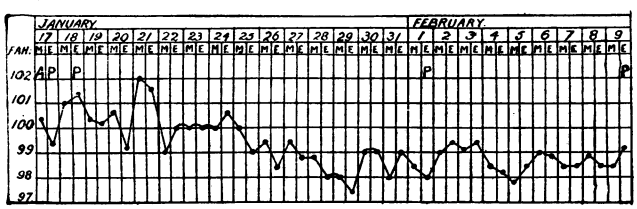

CHART 1.—A, admission; P, lumbar puncture.

(Case 8) of 30 or over for fourteen weeks. It was noticeable in these two most dyspnoeic patients that a rhythmical contraction of the right arm and leg occurred with each inspiration. Several cases had retraction of the head with or without rigidity and stiffness in the limbs; in one the deep reflexes were exaggerated, and Kernig's and Babinski's signs were present. Lumbar puncture was performed on 6 of these patients. In each instance a clear colourless fluid was withdrawn under pressure, in which no micro-organisms were found, but an increase in the number of mononuclear cells (Chart 1).

Two patients had marked myoclonic contractions of the lower jaw muscles, the rhythm of which varied from time to time, but was more or less constant except during sleep. Marked depression was found in two cases, and this quickly passed off under treatment (Cases 48 and 54—Chart 2). Mania was present in three cases only.

One patient only can be classed in Group VI—the hyperalgesic type (Case 11). This was a man, aged 33, who was suffering from the usual symptoms, but his chief complaint was shooting pains down his limbs and in his back and head. This man steadily improved, and after three months was able to leave the hospital free from pain and convalescent.

Two remarkable cases (Nos. 14 and 41) may be classed under Group VIII, the ataxic type. Both were young women, and both had a sudden onset which included giddiness.

One, a lady stenographer, left her office on Saturday at midday, and remembered nothing further till she recovered consciousness in bed in my ward. In the meantime she had gone to the Everton football match, paid her entrance money, taken her place on the stand, and, whilst sitting there, had fallen and been picked up unconscious and brought in an ambulance to the hospital. On admission there was no evidence of injury, and it was possible to rouse her to answer questions in a slow monotonous voice. Her face was expressionless, her limbs were a little stiff with some twitching, but no real paralysis. Nystagmus and ptosis were present. She ultimately recovered and returned to her duties.

The other patient, whilst working in a garden became dizzy, had headache, squint, diplopia, and nystagmus. Later she became an in-patient and it was found that she had definite ataxia when standing with her eyes shut, and also ataxia in her arms. The other symptoms were those of Type I. (Dr. Blair's patient.)

Seven instances of Group IX have been met with, in which the symptoms have been slight and abortive. These patients were walking about, and all complained of headache, lethargy, and showed signs of nystagmus. Five of them had the Parkinson face. A few weeks' rest and treatment completed their recovery, though signs of nystagmus remained for a little time afterwards. One patient had troublesome hiccup of two weeks' duration, and thus should be classed in Group X.

The Parkinson syndrome, so characteristic and seen in nearly all of these cases of encephalitis, may be described as the typical expressionless face, the stiff expressionless gait, in which the patient moves with short steps, arms motionless by his side, head fixed straight to the front and not moving. The voice is frequently expressionless and monotonous. Athetosis was only seen in a small proportion of cases.

Delirium was present in a marked degree in 24 of the patients and was of an occupational character. For instance, a small girl, aged 15, the eldest of a large family, rolled up a towel and rocked it in her arms as though

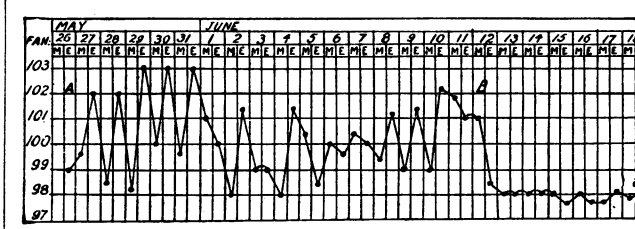

CHART 2—*Case 48.*—Patient very depressed; Parkinson syndrome, nystagmus, and great sleepiness; improved on administration of sodium salicylate gr. x every three hours. Temperature dropped at B when dose was doubled, and symptoms correspondingly improved.

"nursing a baby," A joiner, also a local preacher, "held forth in prayer"; a publican fond of Llangollen was seen making the signs of traffic control, and stated that he imagined "he was in the middle of the main street of Llangollen controlling all the transport of the country, which had become congested there, and which the local police were unable to control." His wife told us that he was an ex-police sergeant, an expert on point duty. Thus, the delirium is connected with the patient's habitual or

favourite occupation, and is usually remembered by him when roused up.

One man, however, though witty and sensible when roused out of his delirium, became so violent, although the other symptoms were improving, that he had to be sent to Mill Road Infirmary, and thence to Rainhill Asylum. On his return, perfectly recovered, he did not remember a single incident of the whole of his illness after the severe occipital pain and dizziness with which it commenced.

It is remarkable how readily a patient can be roused from his delirium and remain sensible whilst spoken to. In this way it is not unlike the delirium of delirium tremens. I would suggest that delirium tremens is an encephalitis due to the toxic effect of alcohol.

Nystagmus, well or slightly marked, was found in about 90 per cent. of the cases. It was noted in many instances that the eyeball followed the finger sluggishly, and frequently returned to the centre where it was at rest. Thus a sort of nystagmoid movement was made by the patient in his effort to follow the test.

Temperature is usually found early in the severe type of case, but does not generally extend more than a week or ten days, and is not as a rule above 100° or 101°. A few instances of a more severe or prolonged fever have occurred. It is noteworthy how many—over 50 per cent.—of the patients have shown no fever; but in several, whether a temperature was present or not, the pulse rate was considerably quickened.

Four patients had marked deafness during part of their illness, two being almost totally deaf, one of whom (Case 49, aged 34) was transferred to my care by Dr. Courtenay Yorke at the Stanley Hospital. She had marked lethargy, slight nystagmus with lagging of the eyeball, and some internal strabismus. The Parkinson syndrome was present, with sleeplessness and tremor of the right hand. She has steadily though slowly improved under three months' treatment, and all the symptoms have passed away except considerable deafness. Persistent deafness of this kind is rare. In the other patients the deafness was only of short duration.

The complications which occurred were not numerous: septic sores of an intractable form were found on the fingers of one patient, sloughing bedsores in another. Herpes was noted three times, and pressure erythema twice. Nephritis was a complication in one case. Recrudescence of symptoms occurred or recurred in several patients. The symptoms were observed to become milder in each recurring attack.

TREATMENT.

The treatment I have found most effective is sodium salicylate 15 to 30 grains every three or four hours. In those cases where there are symptoms of insomnia and restlessness I usually add 5 to 10 grains of bromide and iodide of potassium. Influenza and acute rheumatism respond so well to salicylates that I was encouraged to hope that it would have a similar effect in encephalitis. Moreover, I treat my cases of Sydenham's chorea with this drug, with satisfactory results. Therefore, in the chorea of encephalitis, which is due to the same lesion but another virus, I felt the same drug might have the same good effect. I think the results have been satisfactory, and though signs of change of character and change of affection are noted in the convalescence of a few patients, I believe that the many disabilities and after-effects of this disease will be overcome with a persistence of treatment followed by a return to former environment and former mode of life.

As already stated, in those cases accompanied by meningeal symptoms, lumbar puncture has been performed with considerable benefit. I however look forward to the day when an antitoxic serum or some powerful vaccine will be produced from the specific organism itself.

RESULTS.

It is almost impossible within so short a time of the 62 patients' illness to give a strict account of their recovery. At present they can be classified as follows:

4 deaths—1 two days after admission, with coma; 1 seven days after admission, with coma; 1 seven days after admission, with toxaemia, sloughing bedsores, and septic ulcers in the mouth, after lying in bed in lodgings neglected for two weeks; 1 after five days' illness, with coma.

1 has neurasthenia of sixteen months' duration.
2 show change of affection: "affectionate father intolerant to children"; "wife's loss of affection for husband." Both of these patients are gradually regaining their normal states.
2 remain somewhat lethargic and inclined to loaf about instead of getting to work.
4 have altered character: 2 are not so active as formerly; 1 is inclined to be rude and cheeky; 1 is irritable instead of calm and placid, but is improving.
1 has altered handwriting—small and cramped instead of large and bold.
1 still remains deaf; otherwise she has recovered.
10 are under treatment, all improving—one a recrudescence of a former attack twelve months ago.
3 are chronic cases, all showing improvement: one change of character returning to normal, another showing some Parkinsonian syndrome but otherwise recovered, and a third still showing the Parkinsonian syndrome, though much less pronounced, and with less rigidity.
4 have recovered—any change not known.
30 recovery complete, including 7 abortive cases.

The duration of the illness was, with a few exceptions, two to four months.

This result, though good, shows a marked tendency for some physical defect of nervous origin to occur as a result of this disease, and, what is more serious, change of affection or character. These changes may be temporary or permanent. At present I am unable to say how many of the 24 people who have one or other of these disabilities will have a permanent alteration in character or affection. Nevertheless, I feel it is most important that the medical officers in charge of these patients should encourage them when the illness is over, and, after a prolonged change of air, to get back to their former work. The neurasthenic young lady would, I am confident, be leading a healthy normal life, attending dances and cinemas, if it were not for her devoted mother, who will not tolerate a strict nurse or carry out strict discipline. The same applies to one of the lethargic men, who will not return to work. His wife and daughter do not encourage him to get back.

I am of opinion that some of the mental changes which are considered as sequelae are due to a too lenient treatment in convalescence. For example, the alleged kleptomania in a post-encephalitic boy, who, to demonstrate his complaint when being taken before the magistrate for stealing, lifted a lamp off a police ambulance, shows rather that the lad was an expert in legal defence than a mental deficient.

It is noted that some patients for months have worn the expressionless face and walked with the stiff expressionless gait, but gradually their expressions have become natural, and they have themselves become alert. One patient who left hospital with the Parkinsonian syndrome well marked returned to the out-patients' department a few weeks later cheerful and smiling.

DIAGNOSIS.

In spite of the number of clinical forms met with in epidemic encephalitis there is a marked tendency to the repetition of certain characteristic types, and one type usually predominates during any particular epidemic. Thus, in 1919 and 1920 the somnolent-ophthalmic and amyostatic prevailed, and in 1923 the hyperkinetic. These types are the most common.

The occurrence in a patient of one or more of the following symptoms should make one think of the possible existence of the disease[5]: (1) pathological drowsiness (lethargy), (2) cerebral nerve paralysis (especially ophthalmoplegia), (3) an acutely developing Parkinsonian syndrome, (4) a cataleptic state, (5) a myoclonia, (6) a chorea, (7) pupillary disturbances, (8) violent neuralgia, (9) a poliomyelitic syndrome, (10) a peculiar delirium, (11) a psychotic state, or (12) signs of meningeal irritation in times when encephalitis is epidemic.

The differential diagnosis in these cases has been: apoplexy 2, haemorrhage in pons in 1, meningitis in 5, progressive bulbar paralysis in 1, chorea gravis in 1, delirium tremens in 3, myasthenia gravis in 2, catalepsy or epidemic stupor in 3, neurasthenia and paralysis agitans in several. The most difficult to diagnose was the case which simulated bulbar paralysis; the absence of atrophy of the tongue, together with the improvement of dysphagia and the paresis of the facial muscles, confirmed the diagnosis of encephalitis lethargica.

PROGNOSIS.

It seems almost impossible to give any data on which to form a sound prognosis. My impression has been that the hyperkinetic is more virulent in type, and more difficult to treat, than the somnolent-ophthalmic or amyostatic type. I have seen several deeply cataleptic cases recover. On the other hand, the severe paralytic type, which simulates cerebral haemorrhage, is probably the most serious of all.

The prognosis is always grave, as noted by Farquhar Buzzard[8] and others. My percentage of complete recoveries up to date is only 50. I would, however, strike a sanguine note, always admitting that virulent types and virulent cases do occur. One patient with mania of a most violent and acute type completely recovered in all respects, and a lad with change of character for twelve months has become normal. The Parkinsonian facies has already disappeared in over 50 per cent. of these cases.

I fear that there are many conclusions in this paper left as it were "in the air." I must plead that the disease "though old is new," and therefore it is premature to form other than hypothetical conclusions in many important details.

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[5] *Acute Epidemic Encephalitis:* An investigation by the American Association for Research in Nervous and Mental Diseases, p. 240.
[6] Dr. Stallybrass: *Lancet*, October 27th, 1923.
[7] Wimmer, A.: *Chronic Epidemic Encephalitis*, published by William Heinemann, June, 1924.
[8] BRITISH MEDICAL JOURNAL, December 8th, 1923.

THREE SIMULTANEOUS EMPYEMATA FOLLOWING PNEUMONIA.

BY

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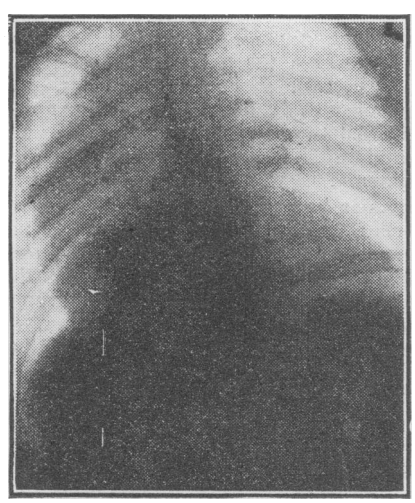
ON January 3rd P. S., aged 29, a bus driver, developed severe pneumonia, which, when I saw him on January 11th, had caused complete consolidation of the whole of the right lung and of the left lower lobe. The temperature became normal on January 12th, and so remained until January 21st, when it rose to 100°; three days later his medical attendant, Dr. Hubert Cox, reported that he had developed signs of empyema on both sides.

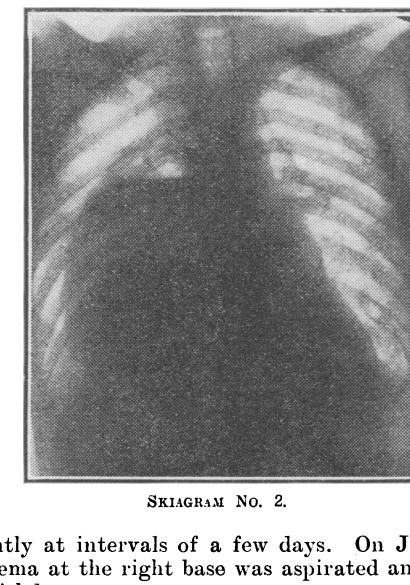
The patient was admitted to Queen's Hospital, Birmingham, on the morning of January 25th. He was cyanosed,



SKIAGRAM NO. 1.

breathed rapidly and with great difficulty, and was extremely ill; the temperature was normal. He had signs of a large empyema at the left base, another over the front of the right lung, and a third at the right base. The axillary region was resonant.

Mr. Gemmill saw the patient with me and decided to operate immediately on the largest collection—namely, the left empyema—which was drained after resection of a rib; 50 ounces of thick greenish pus was removed; microscopically and by culture the pus showed pneumococcus and pneumobacillus, and from it a vaccine was made and administered



SKIAGRAM NO. 2.

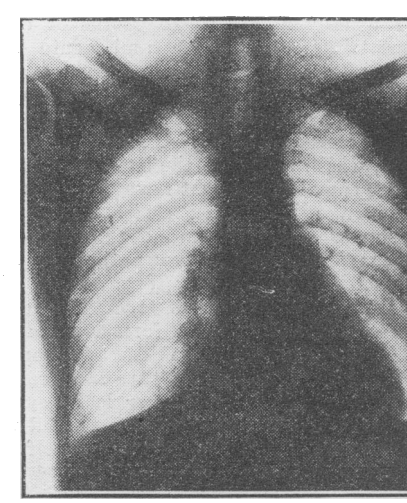
subsequently at intervals of a few days. On January 31st the empyema at the right base was aspirated and 27 ounces of pus withdrawn.

On February 7th skiagram No. 1 was taken; it shows the tube in the left chest, the round shadow of the empyema over the front of the right lung, and the denser shadow of the collection at the right base.

On February 10th the anterior collection was aspirated, but only 7 ounces of pus obtained. Skiagram No. 2, taken on February 13th, shows how much pus remained unaspirated. By February 16th the patient's general condition had so much improved and the expansion of the left lung was so satisfactory that we decided to drain the remainder of the right basal collection, and after resection of a rib Mr. Gemmill completely evacuated it.

A few hours after the patient had returned from the operating theatre a discharge of 26 ounces of pus suddenly occurred through the tube. The anterior empyema had evacuated itself.

Thereafter the patient's progress was rapid: both lungs expanded well, the tubes were removed, and no abnormal physical signs remained. Skiagram No. 3, taken on March



SKIAGRAM NO. 3.

24th, two months after admission, shows no abnormality. The patient left the hospital looking fat and well, feeling better, he said, than he had ever felt in his life.

The result was very satisfactory; whether we went the right way to get it is quite another question.