Four days after a washing out she was able to feed herself slowly and with difficulty, and three weeks later she walked out of hospital. Her expression was less wooden, though all muscles were still spastic.

Case 2.—A woman, aged 19, with a history of acute febrile illness eighteen months earlier, with extreme insomnia, sialorrhoea, and marked alteration in character. She had a well marked Parkinsonian mask. All movements were slow and stiffly performed. She improved in all respects after the sinuses were washed out. She regained normal sleep, salivation decreased, and her expression was less wooden.

Case 3.—A woman, aged 23, who two years and nine months earlier had an acute illness; she was unconscious for twelve weeks. When first seen she had much salivation, was very lethargic, had a mask-like appearance, and was said to have violent fits of temper. She was discharged from hospital after a washing out; a month later she was much improved in appearance, both mentally and physically. Her bad temper became less obvious, the salivation was cured, and her whole outlook on life seemed altered.

Case 4.—A woman aged 23. A very advanced case dating back two years. It would be difficult to imagine greater rigidity of all muscles. She was unable to stand or to feed herself and could hardly speak. She had seen twenty-eight medical men before she came to us. A washing out caused a rapid and definite change in her condition. Four months after discharge from hospital she could walk two miles a day—doing the distance in less than an hour—could feed herself, and read aloud for an hour at a time.

Case 5.—A male, aged 24, in March, 1923, had an acute febrile illness lasting three weeks, with severe insomnia, diplopia, and delirium; no diagnosis was made at that time. Seen in August, 1925, he had a definite Parkinsonian mask, and some rigidity of the right arm. His brother stated that he had altered in character very considerably. After the first washing out he expressed himself as feeling much better. Concentration, which had been much impaired, began to return, the face became less mask-like, and the arm less rigid. In October, 1925, he stated that he was free from symptoms and that mental power had been completely regained; he returned to research work of a very intricate nature.

Case 6.—A woman, aged 32, gave a history of eighteen months' illness, starting with fever, diplopia, and drowsiness. She had the Parkinsonian mask, left ptosis, marked tremor of the right hand and arm, which were useless for all practical purposes. After a washing out she was discharged; a month later she was much improved, the tremor had almost ceased, the grip was good, and her expression was brighter.

In addition to these cases one patient recovered to a great extent, but had a severe relapse six months after discontinuing treatment. Another patient of feeble physique and in a very advanced state made no appreciable progress. Five out-patients, all of whom are improving, are unanimous in ascribing the change to the washing out, and are most emphatic on this point.

We have also had many patients under similar treatment suffering from the cardinal symptoms of encephalitis with the exception of a mask, but the absence of this renders the diagnosis incapable of proof. For the most part they have been less advanced cases, and the improvement after washing out has been considerably more marked than that which has occurred in the majority of patients described above.

We have had little opportunity of treating cases in the acute stage, and none of them has developed a mask.

Acute Cases.

1. A woman, aged 34, was sent to hospital as a case of encephalitis with a four weeks' history of extreme drowsiness and diplopia. She was washed out twice; when seen six months later she said she felt perfectly well, and was bright and cheerful in appearance. She had no tremors, mask, or spasticity of limbs, and vision was normal, but she owned to being more irritable than before her illness.

2. A woman, aged 20, gave a history of three weeks of pyrexia and sleeping "nearly all the time." There were no other symptoms, but she was sent to hospital as a case of encephalitis in the midst of an epidemic. She was discharged ten days later, after a washing out, and is now back at her work, apparently completely cured.

3. A man, aged 35, was admitted with six days' history of unexplained fever, severe insomnia, tremor and spasticity of hands, and feet in position of tetany, fixed expression, and irrational speech. Two days after a washing out the temperature fell to normal, his mind became clearer, and the limbs which had been spastic became looser. The expression returned to his face, and he was able to get up two weeks after admission.

The total number of cases treated has been 64, and of these 45 have had a Parkinsonian mask.

CONCLUSIONS.

1. It is suggested that the infection in encephalitis lethargica is a symbiotic process, that in the first place the nasal mucous membrane is damaged by one of the catarrhal group of organisms, and that subsequently the virus of

encephalitis is inhaled, passes through the damaged mucous membrane, and thus enters the tissues, reaching the brain possibly by the perineural lymphatics.

2. In support of this there is a fair amount of evidence that for the transmission of the disease from one individual to another the virus of encephalitis lethargica must fall on mucous membrane previously altered by inflammation of such a character that its power of absorption of fluids in contact with it is greatly increased.

3. The initial damage to the nasal mucous membrane is generally remediable by treatment, and if remedied it would appear that the virus of encephalitis cannot pass into the tissues, and patients become more susceptible to treatment by drugs.

4. Nasal treatment aims, not at curing encephalitis lethargica, but at preventing admission of fresh virus into the tissues.

5. In those cases where actual destruction has occurred in the central nervous system (a system in which regeneration is impossible) the most that can be claimed for washing out the nasal sinuses is that further irreparable damage is hindered, and in many cases appears to be prevented.

6. The Parkinsonian gait and posture is rarely completely removed without the use of remedial exercises.

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APPARENTLY COMPLETE RECOVERY FROM ENCEPHALITIS LETHARGICA OF THE BULBAR TYPE.

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NOTWITHSTANDING the large number of cases on record, knowledge of encephalitis lethargica is too recent to permit neglect of any clinical material which might serve to illustrate points of diagnostic or prognostic importance. The following case, which was of a very severe type, recovered without any special treatment, and will be found to present some interesting features.

A man, aged 33, was admitted to the Eastern Hospital, London, on April 3rd, 1926. There was a history of two days' illness, which was suddenly ushered in by severe headache with nocturnal delirium. Vomiting and constipation were also complained of, and his medical attendant regarded the case as one of influenza. His condition on admission was as follows. Tongue lightly coated; fauces congested with a collection of mucus in the pharynx; left side of the face immobile; pupils contracted, but no strabismus. He could answer questions rationally, but cerebration was delayed. No pain was complained of, but he had some difficulty in deglutition. The knee-jerk was exaggerated on the right side, and right ankle clonus could be elicited. Babinski's and Kernig's signs were not present. Examination of the heart and lungs revealed nothing abnormal. The bladder was distended, and 38 ounces of urine were drawn off by catheter. The temperature was normal. The symptoms became more marked the next day, with ptosis, inability to swallow, stertorous breathing, and complete unconsciousness. The cerebro-spinal fluid was under slightly raised pressure. The optic discs were pale and sharply defined. Nasal feeding was resorted to. By 10 p.m. the patient appeared to be in *extremis*. Rectal saline with 4 per cent. glucose was ordered.

Throughout the night the patient's condition remained so grave that recovery seemed to be out of the question. He began to improve the next day (April 5th); he became partially conscious, and was able to protrude the tongue, though not to speak. There was incontinence of both urine and faeces. The Parkinsonian facies was very obvious, and the arms were crossed on the chest and paralysed, the right completely; temperature 99.8°. Fibrillary twitching in the muscles of both legs and pharyngeal paresis developed later in the day, followed by an epileptiform seizure of ten minutes' duration.

The next day (April 6th), when ankle clonus was elicited on both sides, clonus was sustained for some seconds on the left side after removal of the stimulus. The temperature was 100.6°. Progress was uninterrupted and rapid, till by April 12th all paralyses had passed off. He had apparently made a complete recovery, and was discharged on May 20th.

The diagnosis of the case presented considerable difficulty at the outset. A consulting neurologist, who saw the

patient on April 4th, inclined to the view that tuberculous meningitis might be a probable explanation of the symptoms, though he had in mind the possibility of lethargic encephalitis. In the light of the subsequent history of the case he fully concurred with the ultimate diagnosis. The prognosis in the early stages of the disease was considered to be hopeless by a number of medical men who saw the patient.

As almost every feature which previous observers have regarded as of grave import was present in this case, the patient's complete recovery must be deemed remarkable. The sudden and severe onset indicated an unfavourable prognosis, as H. F. Smith found a mortality rate of 60 per cent. in cases with sudden onset. The severity of the general symptoms was also of unfavourable omen, as, from a study of the official records of the Ministry of Health, Parsons concluded that cases with marked general symptoms were more fatal than those in which the local symptoms were more prominent. Hall states that sudden death is not uncommon in cases, such as the foregoing, where bulbar symptoms were a prominent feature. Edwin Bramwell has emphasized the gravity of the prognosis in cases where previously deepening lethargy was accompanied by such symptoms as a rising temperature, profuse sweating, and incontinence; sweating, however, was not noticed in the case here recorded. Most observers agree that a severe attack is not necessarily followed by residua, and up to the present none have manifested themselves in this case. In view of the frequency with which cases are recorded as illustrative of the beneficial action of some particular remedial measure, it is significant to observe that a case of the gravest type may recover without any special treatment.

I am indebted to Dr. J. Wilkins, medical superintendent of the Eastern Hospital, for permission to publish this note, and to Dr. G. W. Ronaldson for directing my attention to the literature of lethargic encephalitis.

THE EXPERIMENTAL PRODUCTION OF STONE IN THE BLADDER.*

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THE EXPERIMENT.

EARLY in 1926 young rats to the number of 120—66 females and 54 males—aged between 60 and 90 days, were fed on a diet consisting of tinned Scotch oatmeal 636 grams, linseed meal 240 grams, tinned cornflour 300 grams, sodium chloride 12 grams, calcium phosphate 12 grams, and distilled water 450 c.cm. The ingredients were mixed together and made into cakes by baking in a slow oven. The animals were given as much of this diet as they cared to eat. Distilled water was provided for drinking purposes. One half of them (33 females and 27 males) were given iodine in the drinking water, in the proportion of 0.1 mg. to the litre; the other half were given no iodine in the drinking water. The presence or absence of iodine in the water made no difference to the results in so far as stone in the bladder was concerned.

During the course of the experiment it was observed that the diet was very faulty: the young rats failed to grow normally, cannibalism was frequent, and the animals suffered from a variety of diseases, of which one was urolithiasis, another a severe anaemia resembling "pernicious anaemia" in the human subject. When the experiment had been in progress for one month 16 rats were killed by chloroform and subjected to *post-mortem* examination; similarly, 16 were killed and examined at fortnightly intervals up to the end of the eighth week. Stone in the bladder was not found in any of them. The experiment was then carried to the death of the remaining 72 animals,

the last rat dying on the 157th day. Complete *post-mortem* examination was made in each case immediately after death. The present note deals with those animals found at *post-mortem* examination to have been suffering from stone in the bladder.

The chemical composition of the diet is given in the following table.

Table showing the Composition of the Diet used in the Experiment.

Constituent.	Percentage	
	Expressed on Original Sample.	Expressed on Moisture-free Sample.
Moisture	20.50	—
Mineral matter	5.73	7.20
Ether extractives	10.45	13.14
Crude protein	9.705	12.26
Crude fibre	1.06	1.32
Carbohydrates	52.555	66.08
Total	100.00	100.00
Albuminoids... ..	9.36	11.77
Insoluble mineral matter	0.37	0.465
Soluble mineral matter	5.36	6.735
Total	5.73	7.20
Soluble silica	0.0363	0.0455
Phosphoric acid (P ₂ O ₅)	1.451	1.82
Iron oxide (Fe ₂ O ₃)	0.046	0.058
Alumina (Al ₂ O ₃)	0.366	0.462
Mangano-manganic oxide (Mn ₂ O ₃)	0.0014	0.00176
Lime (CaO)	1.08	1.38
Magnesia (MgO)	1.05	1.32
Potash (K ₂ O)	0.21	0.264
Sulphuric acid (SO ₃)	0.19	0.23
Chlorine	0.396	0.49
Soda and undetermined (by difference)	0.533	0.664
Total	5.36	6.735

The table shows that the protein content of the diet was relatively low; the absence from it of protein of animal origin (milk) was a serious fault. The oatmeal contributed approximately 5.67 per cent. of the total protein, the linseed meal 5.21 per cent., and the cornflour 1.37 per cent. A further fault was deficiency of vitamin A. The sole source of this factor was the oatmeal and the linseed, the amount provided by the cornflour being negligible. All seeds are deficient in vitamin A to a greater or lesser extent; in comparison with others, oats is relatively poor in vitamin A, linseed relatively rich in it. The experimental diet, therefore, though not devoid of vitamin A, did not contain a sufficiency of this factor; the failure of the animals to grow normally and their susceptibility to various infections were due in part to this cause. The diet was not deficient in vitamin B, nor did it appear to be deficient in vitamin E, but it was, no doubt, deficient in vitamin D, although the animals presented no clinical signs of rickets. A further fault in the experimental diet was its richness in phosphates, and in lime, magnesia, and chloride; it contained approximately twice as much phosphorus (P₂O₅), three times as much calcium (CaO), and six times as much magnesium (MgO) as is present in the average well balanced human dietary. To these faults there was possibly added a toxic action of the diet itself on the urinary tract.

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