Cushing and his colleagues came to the conclusion from most laborious and careful investigations that the anterior lobe was the essential element in the gland; that if it was completely removed death must follow very rapidly (in the adult within a few days). This conclusion we cannot confirm, for three of our animals (Cat No. 11, Dog No. 121, Monkey No. 169) survived in health, and yet the pars anterior was completely removed. In these cases it is clear that survival could only be attributed to the preservation of the acini of the pars intermedia infundibuli if the gland is absolutely essential to life.

We are not prepared to make final conclusions on such a difficult subject from a few experiments, and it is clear that scientific opinion must be reserved on the question and whether viability in the hypophyseoprival condition depends on the pars intermedia.

Our material enables us to make comments on certain subordinate points.

1. *Condition of Remains of Gland in Imperfect Extirpation.*—We have obtained a considerable number of complete survivals in all the classes of animals examined—that is, cats, dogs, and monkeys—and in whom *post mortem* minute fragments of one or other of the parts of the gland were found enclosed in the fibrous scar occupying the interpeduncular region. These for the most part preserve the normal appearance of their constituent cells. Occasionally they are atrophied. The full discussion of their histological changes will be given later, but it is clear that in some cases the remains found can hardly with justice be accredited with the survival.

2. *Condition of the Infundibulum.*—The physiological importance of the pars anterior may be considered in conjunction with the hypothesis that it furnishes hormones for subsequent treatment by the rest of the gland. Such a view has been supported by the consideration by Herring and others of the importance of the infundibulum as a duct and channel of transference of the products of the really active lobe, the pars posterior.

Our experiments show that these views must be regarded very closely before they are accepted, since we have not only divided the infundibulum without causing death, but we have also completely occluded it cicatricially in cases where also infinitesimal remains of other parts of the gland were found imbedded in the scar.*

3. *Glycosuria.*—We have observed the occurrence of slight glycosuria in two instances out of seven cases of complete or almost complete extirpation.

4. *Relation of the Hypophysis to Other Internal Secretion Glands.*—We have not observed changes in other internal secretion glands which could be with certainty attributed to the lesions of the hypophysis. This point will also be dealt with in the full paper by Dr. Handelsmann.

REFERENCE.

* Besides Biedl's book we must mention J. Bauer, *Zeitsch. f. d. ges. Neurol. u. Psych.*, 1911, Bd. iv, Heft 3-4; Verga, *La patologia chirurgica*, Pavia, 1911; A. Mühler, *Beit. klin. Woch.*, 1910, Heft 8-9; A. Kohn, *Muench. med. Woch.*, 1910, Heft 28.

* During the passage of this note through the press we have seen a paper published by Morawski (*Zeitsch. f. d. Ges. Neurologie*, etc., Bd. vii) confirming our results in very full detail.

A COMMITTEE has been formed in Berlin, with Dr. Kirchner, Ministerial Director, as chairman, for the erection of a memorial to Robert Koch.

THE committee of management of the Mount Vernon Hospital for Consumption has arranged for the reception of paying patients at its Northwood Sanatorium. Information can be obtained from the Secretary of the hospital, 7, Fitzroy Square, London, W.

THE Department of Tropical Medicine of the New York Post-Graduate Medical School is organizing an expedition to investigate pellagra in the Southern States. The work will start in the spring, and is made possible by the gift to the institution for this purpose of £3,000 by Colonel Robert M. Thompson and Mr. J. H. McFadden.

THE Organization Committee of the Sixth International Congress of Obstetrics and Gynaecology has arranged that the next meeting shall be held in Berlin on September 10th, 11th, and 12th, 1912. The following question is proposed for discussion: "The treatment of peritoneal wounds in its relation to obstetrics and gynaecology." The General Secretary is Dr. Ed. Martin, Berlin N. 24, Artillerie Strasse 18.

ACUTE POLIOMYELITIS:

WITH SPECIAL REFERENCE TO THE OUTBREAK IN PLYMOUTH, STONEHOUSE, AND DEVONPORT.*

BY

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THE recent outbreak of acute poliomyelitis in the district has caused marked attention to be paid to the disease, and has indeed caused alarm both in our own profession and amongst the general population. That the alarm was not without foundation is shown by the large number of cases which have occurred in the Western Counties, so that it is hardly an exaggeration to say that a new terror has been added to the approach of the summer months. This has, unfortunately, been fostered by reports in the daily press, which has persisted in confusing poliomyelitis with cerebro-spinal fever, or "spotted fever," and has given such prominence to the supposed presence, in epidemic form, of the latter disease, that in many places the summer season has been ruined. Happily, only sporadic cases, if indeed any at all, of cerebro-spinal fever have occurred, but poliomyelitis is in itself a disease to dread. It is a malignant affection, attacking children of all ages, but more especially those of tender years, and in the large majority of cases, even if life be spared, leaving only a crippled victim, who carries with him a lifelong handicap.

EPIDEMIOLOGY.

Much attention has recently been paid to the epidemiology of the disease, and Batten¹ has collected the reports of the various epidemics which have occurred during the last thirty years, of which the most severe was that which attacked the population of New York in 1907, when Starr² collected 2,000 cases.

In our Three Towns of Plymouth, Stonehouse, and Devonport, with a population approximating to a quarter of a million, the disease has this year for the first time assumed an epidemic form; the number of cases, so far as I have been able to collect them, was 73. This, however, must be considerably less than the actual number, for many of the slight cases would escape observation, and some of the rapidly fatal cases would not necessarily have been diagnosed as such. For instance, a child dying in a paralytic or comatose condition might have been regarded as a case of sunstroke or of meningitis. One such example occurred in Devonshire, where two children were supposed to have died of sunstroke, whilst a child who had been staying in the same house developed poliomyelitis immediately on its return to Plymouth. It is more than likely that both the fatal cases were infected with poliomyelitis, more especially as they were young children who had not been exposed to the sun.

The disease becomes prevalent in June, and persists through the summer months, July and August showing the greatest incidence. In the Three Towns the first cases appeared early in July, and a few isolated cases have occurred as late as October. It seems probable that the virus is capable of living through the winter and of being exalted in virulence by summer heat, for it is able to offer resistance to relatively low temperatures, experiment having shown that it can withstand a temperature below 0° C. Exposure for four hours in a freezing mixture has failed to kill it.³

ETIOLOGY.

Increased incidence in any disease demands a searching investigation as to causation, and the large number of epidemics which have occurred in the last two decades afford sufficient reason for inquiring into the factors which are at work, and which may be amenable to preventive or remedial measures.

Is poliomyelitis infectious or contagious? That it has been labelled "infective poliomyelitis" is no proof. Before coming to a conclusion on this question it is necessary to distinguish between diseases arising from a common cause, and hence bearing a superficial resemblance to infectious diseases, and those in which infection is actually spread from patient to patient, the latter only being regarded as "infectious." The evidence hitherto adduced seems rather to favour the former theory—infection from some

* A paper read before the Plymouth Medical Society.

common cause. It is uncommon to find more than one case in a family, and in none of the Plymouth cases was more than one affected in the same household. Nor, with the one exception already quoted, where a common cause, equally with direct infection from patient to patient, might be suspected, was there any evidence of contagion. Further, it is practically unknown for the disease to spread in hospitals, though no isolation precautions are usually taken. On the other hand a school has in one instance appeared to act as a disseminating focus (Wickman⁴), and Krause⁵ mentions cases of healthy persons who have contracted the disease after coming into a previously contaminated house. Wickman⁶ believes that the disease can be conveyed through the intermediary of healthy persons who had been in contact with infected patients, and advanced proof of its being transmissible by food or by objects handled by patients. As an example, a lady took charge of some sketches made by a sufferer from poliomyelitis, during the period of convalescence, and shortly afterwards she was attacked by paresis of both legs and complete paralysis of the right thigh (Levaditi⁷).

The proofs, however, of infection by direct contagion, or through the intermediary of "contacts" are scanty, and it would be well to devote attention to the search for some common cause of dissemination. This is not to be found in faulty sanitation or overcrowded dwellings. In the Three Towns the disease has been scattered uniformly over all parts, and no area has suffered in particular. If the cases have more aggregated than elsewhere it has been in Stoke, which is one of the best situated localities, with wide roads and no slums. Some of the worst parts of Plymouth, as the Barbican and the neighbourhood of King Street, where overcrowding and poverty are at their worst, have escaped almost entirely, whilst families living elsewhere in every possible comfort and luxury have been attacked. This feature has been noticed in previous epidemics (Zappert⁸).

An infection may be spread in various ways, the more common being (a) by air and dust, (b) by insects, (c) by food, and (d) by contact with patients.

As regards the last, the scanty proofs available have already been discussed.

Food has been mentioned as an alleged vehicle of infection for poliomyelitis, but a food epidemic would not be so widespread, tending rather to produce numerous cases within a small area, such as the locality served by a particular dairy. When you remember the way in which the disease was distributed in the Three Towns, and think further of the way in which it has appeared all over Cornwall in isolated cases, it becomes evident that food cannot be blamed.

The possibility that the infection is fly-borne has suggested itself to me, but there are several strong arguments against this view. The seasonal incidence is incorrect, for poliomyelitis is more prevalent in the earlier months of summer, whereas fly-borne diseases, such as epidemic diarrhoea, reach their height in September and October. The proximity of stables as a possible etiological factor, in that they form centres for fly breeding, formed one of the points on which information was asked in the circular letter to which so many of you have been good enough to make full replies, but in only two cases were stables reported as being in the immediate vicinity.

We come, therefore, to the question of air or dust conveyance, which I am inclined to regard as the most likely means of dissemination. It has been a year of exceptional dust combined with exceptional heat, and these are two features which are not to be ignored. Further, the virus is one which probably gains entrance to the body by the naso-pharynx. Experimental evidence will be adduced in favour of this, as well as clinical evidence. It seems likely that the heat and dust of 1911 have been factors, both to maintain the virus at a high degree of potency, and to favour its dissemination. I believe that when the records from all parts of the country are collected, further evidence will be adduced in favour of this view. From the few inquiries I have been able to make in rural districts it seems that the cases have occurred in close proximity to main roads, rather than in houses removed to a distance from the roads; this may be due to the former being constantly clouded with dust from passing traffic. The recent development of rapid road traction has, as we all know, played havoc with road-side property, owing to the

clouds of dust raised. Possibly disease as well as discomfort is spread in this manner. The recent Order of the Local Government Board having made it optional to authorities to declare poliomyelitis notifiable, it should be possible to collect evidence for or against this suggestion. If it be proved, it would form a powerful lever in agitating for better road surfaces, and more especially for the widespread use of antidust remedies. Looking at the question from a material point of view alone, the waste to the State from so many crippled children would justify a large expenditure on any preventive measures. In towns the question of dust laying would equally apply. In our own towns the method in use is that of sprinkling from water carts, a comparatively useless method, as it is in no sense a cleansing of streets, is very transient in its effects, and in the very action causes a cloud of dust to arise. We have in Plymouth very few tarred or paved streets, and it is hardly a fair argument to say that no cases occurred in such streets, as many macadamized streets equally escaped.

NATURE OF THE VIRUS.

A great amount of experimental research has been carried out in the last few years in order to ascertain the nature of the virus, and, though hitherto a causal organism has not been isolated, it is within the bounds of reasonable hope that it will soon be. Without going into details, an attempt will be made to summarize the results of this experimental work, of which fuller accounts can be obtained by reference to the bibliography appended, more especially the articles by Levaditi in the *Journal of the Royal Institute of Public Health*.⁹

The first step was Landsteiner and Popper's¹⁰ successful communication of the disease to monkeys by means of inoculating a fragment of the spinal cord of a child who had died from poliomyelitis, the fragment being triturated in isotonic saline solution. The monkeys showed the clinical and *post-mortem* signs of the disease. The American investigators, Flexner and Lewis,¹¹ have in the last three years published many valuable communications, and numerous Continental observers¹² have contributed to our knowledge. The first inoculations were made directly into the central nervous system, but subsequently it was found possible to reproduce the disease by injection into the peritoneal cavity, the blood vessels, and the nerves, and to pass the disease successfully through many monkeys in series, Flexner and Lewis having a virus in its twenty-fifth generation. The only other animals in which experiment has successfully reproduced the disease have been rabbits.¹³

As to the nature of the virus nothing certain is yet known. It is at present ultra-microscopical, or, at any rate, has defied staining. It is capable of traversing Berkefeld filters, for when an infected cord is suspended in glycerine and the fluid then filtered the filtrate is toxic. Fragments of infected nerve tissue preserve their toxicity for four days at ordinary temperatures, and for seven to twenty-two days if kept in glycerine, 1 in 3. Exposure to a temperature of 60° C. for fifteen to twenty minutes killed the virus, and an hour at 50° C. was also fatal, whereas four hours in a freezing mixture did not destroy its pathogenicity.

The virus is capable of travelling through some of the tissues. Thus the injection of a nerve trunk with a few drops will produce the disease, though if the nerve be divided the onset of the infection can be prevented. In this there is a resemblance to tetanus. It can also travel by means of the circulatory and lymphatic systems, for the disease has been caused by injecting virulent material into the inguinal glands, and the virus has likewise been traced in the lymphatic glands which drain the area in which a subcutaneous inoculation has been made. In a fatal case in a child, inoculation of material from a mesenteric gland produced the disease in a monkey.

Perhaps the most interesting discovery has been that the mucous membrane of the naso-pharynx of paralysed monkeys contains the virus, for this membrane has been removed, rubbed with quartz sand, filtered, and the filtrate when injected has produced the disease. Lastly, if the mucous membrane of the naso-pharynx be scarified, and the virus then rubbed in, paralysis will follow, though painting on the virus without scarification had a negative result.

Thus it will be seen that experimentally the disease can be produced in a variety of ways. If the theory of dust infection be accepted, the last quoted observations are more than suggestive of the site of entrance.

PATHOLOGY.

The disease is an acute toxic process affecting the central nervous system, and having a particular affinity for the anterior horns of the spinal cord. A detailed description of the inflammatory and thrombotic changes, with resultant fibrosis, need not detain us, as it will be found fully described in all textbooks.¹¹ In its affinity for the nervous system, and the fact that the spinal cords of victims are pathogenic, there is a marked resemblance to rabies, which also has hitherto baffled attempts to isolate an organism. A parallel might be drawn between diphtheria and poliomyelitis in their action on the anterior horns, but in the former it is a toxin which causes the nerve lesion, whereas in the latter the virus is itself present in the nervous tissues.

STATISTICS OF EPIDEMIC.

Passing now to the results of the local outbreak, it will be found that they conform fairly closely to those previously described.

Number of cases	...	...	...	...	73
	<i>Sex.</i>				
Males ...	...	...	...	...	33
Females ...	...	...	...	...	20
Not stated	...	...	...	...	20
	<i>Age.</i>				
Oldest ...	...	...	...	...	52 years.
Youngest ...	...	...	...	...	11 weeks.
Average age of 71 cases...	...	...	...	...	6 years.
Ages of fatal cases, 2½ years, 6 years, 7 months, 16 years, 2 years, and 17 years.					

Results, so far as can be Recorded.

Complete recovery	...	...	...	...	7—10%
Deaths...	...	...	...	...	6=8.2%
Two legs paralysed	...	...	...	...	10
One leg paralysed	...	...	...	...	19
One arm paralysed	...	...	...	...	7
Two arms paralysed	...	...	...	...	1
Arm and leg paralysed...	...	...	...	...	5
Three limbs paralysed...	...	...	...	...	2
Four limbs paralysed	...	...	...	...	3
Back paralysed	...	...	...	...	2
No details except that paralysis remains	...	...	...	...	11

CLINICAL NOTES.

I propose only to touch on certain symptoms which are not fully dealt with in textbooks.

The clinical course of the illness is fairly definite in the majority of cases. It commonly commences abruptly with a rise of temperature, usually up to about 102° F., the highest I have seen being 104.6° F. There is a general malaise, and vomiting and diarrhoea have been described in some epidemics, though rarely in this. A not uncommon feature is the presence of a rhinitis or sore throat, and in a considerable number of cases here it has been supposed at first that the patient or other members of the family were suffering from a common cold. This is very suggestive of infection by way of the naso-pharynx. Römer¹⁵ noted inflammation of the tonsils in many cases. A further confirmatory symptom noticed here and in Cornwall has been epistaxis.

After about forty-eight hours, as a rule, the paralysis is apparent, and it almost always shows itself first in the lower limbs, and may proceed to affect the upper limbs, the muscles of the abdomen or back, and those of deglutition and respiration, according to the severity of the infection. In rare cases the cerebral nerves have been involved, owing to an encephalitis, and in one case I saw distinct mental changes, as evidenced by extreme irritability and slight delusions, which came on after the pyrexial period. In the very severe cases the resemblance to Landry's paralysis is very striking. Bladder and rectal troubles are common—a condition probably due to the loss of power in the abdominal muscles rather than to any actual visceral interference. The symptom of frequent micturition, however, suggests that the virus may be eliminated by the kidneys, and in so doing set up a mild cystitis.

Pain is a symptom which is very common, and it often persists for a long time, even as late as eight weeks after

the infection. The paralysed limb may be so exquisitely tender as to render handling almost impossible, and when this symptom is prolonged into convalescence it renders it very difficult to apply adequate massage and electricity. A possible explanation is that the inflammatory and exudative processes involving the anterior horns cause pressure also on the grey matter of the posterior horns.

In no case have I seen optic neuritis, even where encephalic trouble was present.

DIAGNOSIS.

Cases which do not conform to type present the greatest difficulty in diagnosis. A case I now have under observation in the hospital has typical infantile paralysis of the right leg and a spastic condition of the left leg, the latter limb also having an extensor plantar reflex. Such a mixed symptom-complex rendered diagnosis difficult, and a lumbar puncture was negative in result. I think it may be explained by the presence of an ordinary poliomyelitis causing the trouble in the right leg, coupled with a right cortical infection resulting in the spastic condition of the left leg.

As regards diagnosis, the great difficulty appears to have been to discriminate between poliomyelitis and cerebro-spinal fever. Clinically, however, the diseases are widely differentiated in the majority of cases, the first-named being a destructive lesion, and the second—at any rate, in its earlier stages—an irritative lesion. In cerebro-spinal fever the rigidity of the limbs, the presence of Kernig's sign, the extensor plantar reflex, the early appearance of optic neuritis, should prevent a mistake, whilst lumbar puncture affords a very ready and certain means of diagnosis. Even if it be not possible to undertake a careful search for the meningococcus, the great excess of cerebro-spinal fluid, and in that fluid the presence of an excess of albumen, are distinguishing signs which poliomyelitis does not give.

TREATMENT.

The ordinary means to abate fever and pain, coupled with careful nursing, are all that we can at present employ. Urotropine, of help in cerebro-spinal fever, I have found useless, because, though its oral administration leads to the presence of formaldehyde in the spinal fluid, this drug is hardly likely to be brought into sufficiently intimate contact with the virus.

In all stages the greatest care should be taken to prevent contractures from the overaction of non-paralysed muscle groups, and I have found it wise to employ plastic splints to this end. This, coupled with massage and electricity, and the administration of small doses of potassium iodide, form the routine treatment after the acute stage has passed. Subsequently, careful surgery, by means of tendon or nerve transplantation, may be expected to achieve considerable results in restoring the function of the limbs.

IMMUNITY.

The knowledge as to immunity and serum-therapy is in its infancy, but there is reason to hope that the future may contain a serum treatment for poliomyelitis akin to that for rabies.

The fact has been established that artificial immunity can be conferred by progressively increasing doses of the virus. Monkeys, also, which have recovered from the disease exhibit a complete resistance to reinoculation.

The serum from monkeys who have recovered from the disease has some inhibitory effect on the virus; 2 c.cm. of such serum, mixed with 2 c.cm. of a filtrate of the virus of maximal potency, and injected into a monkey, caused no ill effects, whilst a control monkey died from a similar dose of the virus. Normal monkey serum had no inhibitory effect, nor had normal horse serum.

I have endeavoured to put before you a summary of the recent researches into the causation of poliomyelitis. Much yet remains to elucidate, but we may anticipate great steps forward, leading to the goal of successful prevention and treatment. Until then, whilst the uncertainty remains as to the methods of dissemination and infection of the disease, it must be regarded as infectious, and should be made notifiable everywhere. A moderate degree of isolation should be exercised, especially as regards children, and it might be well to employ an antiseptic naso-pharyngeal wash, such as hydrogen peroxide, which

has the power of destroying the virus, in all cases of contact.

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CLINICAL OBSERVATIONS ON AN EPIDEMIC OF ACUTE POLIOMYELITIS IN CORNWALL.*

BY

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AND

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THAT acute anterior poliomyelitis has appeared in this country in a serious epidemic form is conclusively proved. There was a series of cases in Bristol from June, 1909, to January, 1910, as reported by Parker in the BRITISH MEDICAL JOURNAL of March 18th, 1911. The disease during the present year has appeared in the counties of Devon and Cornwall. In the former county the disease has been more severe than in Cornwall, there having been about 90 known cases in Devon, while in Cornwall the number of ascertained cases to the present date is 42.

The first and the majority of cases coming under our own observation occurred in Penryn. This town has a population of about 3,000 inhabitants, and is situated at the head of one of the tidal estuaries of the River Fal—the Penryn River—about two miles above Falmouth. It is a very ancient town, and the inhabitants are mostly working-class people. The majority of the houses are old, huddled together, and in many cases are in a very insanitary condition. The sewage is water carried, and is discharged into the creeks in a crude condition, and is left exposed on the ebb tide. Little attempt is made by the sanitary authorities to remedy matters, the streets being badly scavenged and the town generally dirty.

The first case occurred on January 23rd. The next case was noted on May 27th (Case xii), and in connexion with it it is interesting to note that a horse belonging to the patient's father had what is locally known as "poke-neck." It is said to have been paralysed in the neck and forequarters. It fell down in the stable and was unable to rise. When taken out, with assistance, it again fell. It was shot without having been seen by the veterinary surgeon. This happened a week before the child was taken ill. Case v occurred on June 8th. This boy's father had been in the house of Case xii.

Of the 9 cases in Penryn, 5 were in West Street, which is a narrow street on the main road, with a considerable amount of motor traffic. The road has been tar-sprayed for the first time this summer, so that the dust nuisance has been reduced to a minimum. The occupants generally are poor and not over cleanly in their habits. Though we have been unable to trace contact in all those cases, there is strong presumptive evidence that such did take place, as the street is the only playground of the children. No doubt, too, there is much visiting among each other's houses; and also one of the cases occurred in a grocer's shop. Two cases occurred in the village of Mylor, also situated at the head of another tidal estuary of the Fal.

There was distinct contact with one of these cases with another case in Truro. One occurred in Budock and two in Falmouth, four in Camborne, and two in St. Austell. No two cases occurred in the same house, with the exception of the St. Austell cases.

It is interesting to note that the children in Penryn bathe regularly in the sewage-contaminated creeks. Of those attacked, no single case had at any time bathed or waded in this polluted spot. This is quite contrary to the experience of the Massachusetts epidemic, where 62 out of the 150 were proved to have been swimming or wading in polluted waters.

Another interesting observation during the course of the Penryn epidemic was the number of cases of herpes zoster occurring in the practice of one of us (Hopper). The majority of the persons affected were old, and mostly women. Various parts of the body were affected by the eruption—namely: (1) Six had lesions over the neck, shoulder-blades, deltoid and pectoral muscle; (2) four over the intercostal muscles; (3) three over the recti and buttocks; (4) three on the lower limbs (total of sixteen). In most of them constipation was a marked feature, and in many of the cases there was severe pain and general malaise. In no other space of time have so many cases occurred in this district, and therefore the question naturally arises, Is the same organism at work in both diseases?

Age.

The ages of the patients ranged from 10 months to 50 years. The rejection of the term "infantile paralysis" is now therefore fully justified, seeing that persons of all ages are subject to the disease. With one exception, however, those who have lost the use of their limbs, or have their limbs permanently impaired, are under the age of 8. All cases of the encephaloid type have been fatal.

Sex.

There were 14 males and 7 females.

Mortality.

There were 5 deaths in the 21 cases recorded, giving a mortality of 23.8 per cent.

Symptoms.

The most outstanding symptom, and one which occurred in every case, was derangement of the intestinal tract; there was either constipation or diarrhoea, or both. In all cases the motions were exceptionally large, and very foul-smelling. In contradistinction to this, except in five cases, three of which had epistaxis and two had slightly reddened fauces, there was no affection of the naso-pharyngeal mucous membrane. Two cases had slight enlargement of the cervical glands. One case was diagnosed as summer diarrhoea. This is certainly against Flexner's theory that the virus enters the body through the air passages, and would rather point to the alimentary canal as the point of entrance. This view is strengthened by the fact that there were six cases in which retention of urine was observed; one had incontinence. One case had to be catheterized for eight weeks. Great irritability and pain were present in all the cases; in some cases the latter was most distressing, the patient crying out for hours; the least movement of the paralysed limbs increased this. A rash was present in six cases which were seen through all the stages of the disease. In every case it was typically urticarial, a fact which again supports the theory that the infection is intestinal. The temperature never rose above 103° F., generally it was about 100° F. in the observed cases; but it must be borne in mind that some of the cases were not seen till the initial stage had passed and the paralysis had developed. Only one case recovered completely; all the others will be disabled more or less for life.

Classification of Cases.

We have arranged the cases into groups in a more or less arbitrary manner. There is no marked distinction between the encephaloid type and the others, which in reality only differ in degree and often pass the one into the other, depending apparently on the virulence of the organism, the resisting power of the patient, and the part of the nervous system attacked.

* A paper read before the Clinical Section of the Royal Society of Medicine on October 13th, 1911.