anaesthetic even for prolonged periods. If cyanosis appears, this withholding of the anaesthetic is called for imperatively. It need hardly be said that when morphine is contraindicated on general principles it is better to avoid using scopolamine also, although this latter drug certainly renders the associated use of morphine more free from danger. The older method of employing morphine and atropine before chloroform or ether is, I think, less safe than the combined use of scopolamine, morphine and atropine. Some surgeons have extolled this injection method as a preliminary to the continuous inhalation of nitrous oxide-oxygen for even prolonged operations. The average doses are scopolamine $\frac{1}{100}$ grain, morphine $\frac{1}{10}$ grain, and atropine $\frac{1}{100}$ grain, given one hour before the general anaesthetic. Sometimes it is well to divide the dose, giving half an hour before and half just before the inhalation. It is commonly thought that young children are not so suitable for this method, and I have little experience of its use for them. As to dosage, although the amounts I have mentioned are usual, yet it is necessary to modify them according to the physique and state of the patient. Some robust men need more, some feeble persons require smaller doses. A word must be said about the after-treatment of these cases. The patients usually pass into a profound slumber when the operation is finished, and so need heedful watching for some hours, indeed until the narcotic effects of the injection and anaesthetic have passed off. As the respirations remain slow and shallow the progress of elimination is very slow, and the sleep may persist for a long time. The stupor need cause no alarm if the breathing is regular and adequate and albuminuria or glycosuria is known not to be present. I have no more time at my disposal, and must therefore conclude this brief summary of the means we possess to satisfy the demands of modern surgery, at the same time safeguarding our patients from unnecessary risks.

[The address was followed by a detailed explanation of the apparatus mentioned.]

REFERENCES.

¹ BRITISH MEDICAL JOURNAL, September 17th, 1910. ² *Journal of Physiology*, 1910, vol. xi, p. 294. ³ *Transactions of Society of Anaesthetists*, 1900, vol. iii, p. 69. ⁴ BRITISH MEDICAL JOURNAL (with Dr. Levy), 1900, vol. ii, p. 833. Effects of Inhalation of Certain Anaesthetics upon the Kidneys. ⁵ BRITISH MEDICAL JOURNAL, April 23rd, 1910. ⁶ See *Proceedings of Royal Society of Medicine*, vol. iv, p. 43; also the *Clinical Journal*, June 14th, 1911, for papers by the present writer which deal in detail with this subject.

PRELIMINARY NOTE ON EXPERIMENTAL INVESTIGATIONS ON THE PITUITARY BODY.

BY DR. HANDELSMANN
AND
SIR VICTOR HORSLEY, F.R.S.

In the last few years the bibliography concerning the pituitary gland has been steadily growing. Scarcely a month passes without a new work on the subject, either on the pituitary gland alone, or in connexion with the other glands of internal secretion. The present note cannot contain a summary of such an extensive bibliography, and we must refer our readers to the latest collected works on the pituitary gland, especially to that of Biedl, *Innere Sekretion*, 1910.¹

In our experiments we have tried only to determine what influence a complete or partial extirpation of the gland exercises on the organism. The first to perform such experiments was Horsley in 1886, after whom a series of authors (about twenty) repeated the experiments with results which were not uniform. In some investigations the animals succumbed soon after the operation, in others they survived for long periods. Among the more recent experimenters are Stöderius, Gemelli, Aschner, Ascoli, and Legrain, and especially Paulesco and Cushing. Of these writers the last named has conducted a series of researches for several years, and has with his colleagues treated the subject in great detail. The first three authors found that the removal of the gland does not always lead to death, but that at least the gland is essential in develop-

ment. The last three say that complete removal of the gland causes death very rapidly. Cushing says:

Total removal of the hypophysis leads inevitably to the death of the animal with a peculiar and characteristic train of symptoms—cachexia hypophyseopriva, that is, low temperature, slow respiration, typical flexion attitude of back and incurvation of tail, spasmodic opening of the jaws; the animals are drowsy, lethargic, anaesthetic to a painful stimulus, and finally pass into deep coma. Sometimes, however, death did not occur as promptly as Paulesco claimed; for puppies might remain in an apparently normal condition for at least three weeks before the terminal phenomena appear and the latter might persist for one to three days.

Removal of the posterior lobe, according to Paulesco and Cushing, does not produce the fatal symptoms, but only complete removal of the anterior lobe.

We have made experiments on 54 animals—namely, 20 cats, 21 dogs, and 13 monkeys—in which the pituitary gland was reached by either of two methods—(1) temporal, (2) palatal. The second method we have employed only in the cat. In the temporal method the opening of the skull was made on one side only, the left. In some cases we did not remove the gland, but only separated it from the base of the brain; in some others we cauterized the infundibulum. In about half of all the experiments we observed cerebral symptoms—*mouvements de menège*, hemiparesis, hemianopia, and in all monkeys temporary ophthalmoplegia on the side of the operation. All these symptoms gradually passed away. In all cases, with the exception of animals dying from operative shock, we have made a very careful microscopical examination of the sella turcica and of the base of the brain. Dr. Handelsmann will in a further paper give the full details of our experiments, and we will in the present note only describe the general conclusions arrived at.

Of the whole series of experiments, in 15 (2 cats, 9 dogs, and 4 monkeys) the gland—for example, pars anterior, pars posterior, and pars intermedia fissurae†—was completely removed; that is, we could not find even cells of the pars intermedia infundibuli. We had also some animals in which there were some few cells of the pars infundibuli remaining; but these animals we do not count as having had a complete removal of the gland (contrary to Cushing), because sometimes in these remnants we found quite active cells with colloid in the lumen of the acini, and so on. On the other hand, to show that after the so-called complete removal of the gland‡ all the animals do not always die quickly with symptoms of cachexia, as Cushing and Paulesco claim, we present the following facts.

Eight animals died within forty-eight hours—for example, from shock, haemorrhage, or infection. We do not consider that those authors who have obtained similar results are justified in ascribing these fatal results to the loss of the function of the gland. Of the remainder, three died within four days with no symptoms regarded by Cushing as characteristic of a cachexia; but where not due to one of the above-named causes were, in our opinion, attributable to oedema cerebri.

There remain four cases (all monkeys); in three of these death occurred naturally on the 13th, 14th, and 39th days, and one animal was killed in good health on the 115th day.

In the three instances in which the animal died naturally no “characteristic” symptoms were observed, and the animals became asthenic and died, as many monkeys do in captivity. However, we reserve, of course, any absolute opinion on these cases, as it is clear they may be claimed in support of the opposed view—namely, that the removal of the function of the gland is necessarily fatal. This absolute conclusion is, however, obviously negated by the fourth case.

Further, we have observed a parallel death-rate in animals in whom incomplete extirpations had been made.

It is clear that the whole question of the vital importance of the gland will require careful reviewal, and this has been rendered especially necessary by the researches of Cushing.

* Some of these animals were demonstrated at the meeting of the Physiological Society on March 18th, 1911, and the specimens from the same animals on July 1st, 1911.

† According to our view, the epithelial cells of the pars intermedia must be differentiated into those lining the cleft between the lobes (pars intermedia fissurae) and those forming a circle round the infundibulum (pars intermedia infundibuli).

‡ We say “so-called” because very possibly there is in some cases an accessory gland in the canalis cranio-pharyngealis which perhaps becomes hyperactive when the gland is removed.

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.