the stimulus. A lesion of the sensory cortex disturbs both these characteristics. Tactile sensations became uncertain and incalculable, and no threshold can be obtained; persistence and hallucinations mar the uniformity of the records.

Now we have shown that the sensory cortex is the organ by which attention can be concentrated on any part of the body that is stimulated. The focus of attention is arrested by the changes produced by cortical activity at any one spot. These are sorted out and brought into relation with other sensory processes, past or present. Then the focus of attention sweeps on, attracted by some other object.

All stimuli which appeal to the thalamic centre have a high threshold. They must reach a high intensity before they can enter consciousness, but once they have risen above the threshold they tend to produce a change of excessive amount and duration, and this it is the business of the cortical mechanism to control. The low intensity of the stimuli that can arouse the sensory cortex, and its quick reaction-period, enable it to control the activity of the cumbersome mechanism of the thalamic centre.

Our view of the sensory mechanism put forward in this paper explains many of the facts already recognised both by psychologists and clinicians. It enables us to understand how integration can occur at all afferent levels of the nervous system, and makes development possible even in the individual. The aim of human evolution is the domination of feeling and instinct by discriminative mental activities. This struggle on the highest plane of mental life is begun at the lowest afferent level, and the issue becomes more clearly defined the nearer sensory impulses approach the field of consciousness.

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SALVARSAN IN SYPHILIS.

By WILLMOTT EVANS, B.S., B.Sc. LOND., F.R.C.S. ENG.,
SURGEON TO THE ROYAL FREE HOSPITAL, LONDON.

THE reception of salvarsan by the medical profession in this country has been by no means uniform. While many favourable results have indeed been reported, it is also the fact that many expressions of opinion have appeared during the last few months in the medical journals adverse to the utility of salvarsan in the treatment of syphilis. It is true that for the most part these have come from those who have had but little practical experience of the method; nevertheless they have received, and have deservedly received, attention owing to the high position occupied by their writers. In these circumstances I feel it to be almost a duty to bear witness to the good results which I have seen follow the use of this drug, and that I should state that so far no harmful effects have come under my notice. Whether salvarsan will fulfil all the great expectations which were entertained on its first publication is doubtful, but that it is a drug strikingly effective in the treatment of syphilis I am fully persuaded.

This paper is intended to be nothing more than a preliminary note on the subject, for I hope later to publish a fuller account of my experiences with salvarsan, but my object in bringing forward the matter now is to show that if care be taken in the selection of the cases and the drug be administered cautiously the results obtained are extremely good, and in some cases at least have proved to be unattainable by other means.

Before the drug was put on the market Professor Ehrlich, at the request of the Editor of THE LANCET, very kindly sent me a supply of ampoules of "606" for the purpose of testing its value, and from that time to the present I have used it. My aim in its employment was to observe carefully the results of its use in comparatively few cases rather than to administer it to every case of syphilis seen by me. Also, in order to test the value of the drug with care, I did not inject any cases except those which gave a positive Wassermann reaction in addition to giving clinical signs of the disease. I rejected some cases in which the reaction was negative, even though clinically the diagnosis of syphilis was extremely probable or even practically certain, because I wished to be sure that the case was certainly syphilitic. I have employed the drug both in primary, secondary, and tertiary manifestations of the disease, and also in some cases exhibiting those later manifestations of syphilis which are often called parasyphilitic but are better called quaternary. Instead of giving particulars of the whole series, I think that I can more clearly present the effect of the treatment, and that the conclusions may prove of more value to others if I state simply the results which I have obtained.

Dose.—In my early cases I employed 0.45 gramme, but later I employed 0.5 and now 0.6 gramme. It has appeared to me that the improvement in the cases has been more rapidly shown with the larger dose, and I have not seen harm result from it in any case. It is possible that later the dose may have to be somewhat increased, but as to that time will show.

Mode of administration.—In my early cases I administered the drug by an intramuscular injection, and though it is an effective method it certainly gives rise to a good deal of pain for a few hours. This pain can be, in great part, controlled by a hypodermic injection of a quarter of a grain of morphine, and I have found it a good plan to give this morphine injection ten minutes or a quarter of an hour before the injection of the "606." Later I injected the drug intramuscularly in the following manner. The posterior fold of

the axilla is picked up between the finger and thumb an inch or two below the level of the angle of the scapula, and as this fold is formed by the latissimus dorsi that muscle will be held. The needle of the syringe is then passed deep to the muscle, so that it lies between the latissimus dorsi and the serratus posticus inferior. The injection of the preparation into this space causes much less pain than when the injection is intramuscular, for there is much less tension, and though the pain is sometimes troublesome, yet it is readily controlled by a hypodermic injection of morphine.

Mode of preparation for an intramuscular or intermuscular injection.—The method of preparation I have employed has been practically that which was shown me by Mr. J. E. R. McDonagh. The powder is rubbed up with a solution of sodium hydrate and then treated with acetic acid until the liquid is still just acid and then a little solution of sodium hydrate is added until it is just alkaline. The syringe used has a glass barrel and a solid metal piston. It was used fairly warm for two reasons, mainly not to chill the liquid to be injected, but partly also because when warm the piston fits more closely. The liquid is drawn into the syringe and then a little warm water is used to wash out the mortar, and that is also drawn into the syringe. Prepared in this way the bulk of the liquid is not great; it varies between 8 and 12 c.c., 9 or 10 being about the average—that is to say, it measures between two and three teaspoonfuls. The fluid is injected gently and the pain is not very great.

In the intravenous injection a weak alkaline solution is made as follows: A bottle is taken with divisions showing 50 c.c. About 100 c.c. of sterile water or saline solution are placed in the flask which contains a number of glass balls; the salvarsan (0.6 gramme) is then added and about 18 or 20 minims of 15 per cent. solution of sodium hydrate are added until a clear solution results. The bottle is shaken while the alkali is being added and the balls assist the solution of the powder. The bulk of the liquid is then made up to 300 c.c., which is the amount to be administered. A sharp needle is attached to a piece of rubber tubing and to the other end of that is a glass funnel. The funnel and tubing are filled with saline solution at a temperature of about 105° F., and the skin over the front of one elbow is painted with a 3 per cent. alcoholic solution of iodine. By means of a bandage tied round the upper arm the veins are rendered distinct, and the needle is inserted into one of the veins in front of the elbow, either the median cephalic or the median basilic, and some of the saline solution is allowed to run in. Then some layers of sterile gauze are placed in the mouth of the funnel for the purpose of filtering the solution which is poured into the funnel. The time taken by the 300 c.c. in entering the vein should, I think, be between 20 minutes and half an hour. When all the solution has been injected, it is well to let a little saline solution flow through the needle, so that when the needle is removed no salvarsan is left in the tissues. Some precautions are of great importance. All the apparatus employed must have been carefully sterilised. The solution should not be too cool, it is best to have it a few degrees over 100°, otherwise it may chill the patient and perhaps cause a shivering fit. The flask is easily warmed by standing it in hot water.

Wassermann's test.—As I have mentioned above, I have not injected any case with "606" unless and until it has given a positive Wassermann test. In some of the cases the fact that the test was negative was probably due to previous administration of mercury; nevertheless, I did not inject any case until the Wassermann test became positive. I have found that it may take between two or three months for a Wassermann test to become positive after it has been negative from the administration of mercury. I am aware that it has been stated that mercury does not interfere with the Wassermann test, but that has not been my experience.

Harmful results.—I have had no results which could be called harmful. In no instance has an abscess formed locally, though in one case a little fluid collected at the site of injection, but the contents were quite clear. In no case have any ocular symptoms resulted. I cannot help thinking that in most of the cases in which harm has resulted there has been some fault in technique. In some instances apparently the solution has been injected into the vein without filtration, so that the risk of embolism has been run. The greatest care is required and must be used.

Stage of the disease.—The drug has proved efficacious in all stages of syphilis—in the primary, secondary, and tertiary stages, and also in the parasymphilides. I think the most

rapid results followed the treatment when the disease was in the tertiary stage. The manifestations of the secondary stage were distinctly less rapidly affected, possibly because, as Ehrlich has suggested, the drug cannot affect an area where the vessels are thrombosed. I need not describe in detail any cases in which the manifestations were those common in syphilis, but there are a few that deserve special mention.

In the first case which I injected the patient was a young woman, who had numerous manifestations of syphilis probably congenital in origin. She had on the leg a deep gummatous ulcer, measuring some 2½ inches in length and an inch in breadth. The depth also was about an inch. In addition she had a gummatous deposit in the left orbit causing some proptosis; there were marked atrophy of the disc and little more than the perception of light. At first I had some hesitation about using the drug in a case where the eye was already damaged, but it was clear that the loss of sight of the left eye was so serious that no real harm could be done. As a result of the injection the proptosis almost disappeared and curiously the vision improved markedly. The ulcer on the leg healed, though slowly. A few weeks later slight ulceration reappeared in the scar of the leg, but it only lasted for a short time and it again healed and has not broken down since, and no syphilitic manifestation has appeared subsequently, although nearly two years have elapsed since the injection. In this case the patient had been very thoroughly treated with mercury by one of my colleagues, but without effect.

In one case, where several nodules existed on the skull and much thickening of the left femur was present, rapid recovery followed the use of salvarsan, and, further, an old ununited fracture of the tibia united a few weeks after the injection.

In another case a woman was injected during the third month of pregnancy; labour took place at term, and the child was born perfectly healthy, and neither child nor mother has since exhibited any manifestations of the disease. In fact, the child is above the average in well-being.

In several cases of syphilis of the spinal cord and brain the improvement was marked, though the first signs of improvement were slow in appearing.

I used salvarsan in a fairly early case of general paralysis of the insane, but no noticeable improvement occurred. I am inclined to think that for intracranial syphilis the intramuscular method of injection is better than the intravenous, for the introduction of the drug into the circulation is less rapid. In most cases, however, I have no doubt that the intravenous injection is far preferable to any other mode of administration, but I repeat once more that it needs much care.

Recurrences.—So far I have had no case in which I have found it necessary to repeat the dose; doubtless in time such cases will occur to me as they have occurred to others.

Conclusions.—Judging merely from my experience of the cases treated by me, I can say that salvarsan is a rapid, safe, and effective treatment of syphilis. That it affords a permanent cure it is as yet impossible to say, but from our present knowledge it appears to me the most satisfactory method of treatment.

Harley-street, W.

ON THE PRACTICAL RESULTS OF THE RECENT ADVANCES IN THE DIAGNOSIS AND TREATMENT OF SYPHILIS.¹

By J. H. SEQUEIRA, M.D. LOND., F.R.C.P. LOND.,
F.R.C.S. ENG.,

PHYSICIAN TO THE SKIN DEPARTMENT OF, AND LECTURER ON DERMATOLOGY AT, THE LONDON HOSPITAL; CONSULTING DERMATOLOGIST TO THE RADIUM INSTITUTE.

I WOULD, in the first place, insist upon the importance of a wide recognition of the advances which have been made in the diagnosis and in the pathogeny of syphilis as well as in its treatment. The work of Roux and Metchnikoff, of Neisser, Ehrlich, and many others has brought to fruition the epoch-marking discovery of the *spirochæta pallida* by Schaudinn, a discovery not less important to the community

¹ Abstract of a paper read before the Plymouth Medical Society on Dec. 16th, 1911. The paper was illustrated by photographs and coloured drawings of patients.