have a syphilitic basis; and, if I am correct in the view that the cerebral lesion is multiple, it is a further corroboration of the syphilitic theory, as we know that syphilitic lesions of the nervous system are often multiple. At all events, we shall put him fully under the influence of mercury by rubbing a drachm of strong mercurial ointment into some soft part of the skin daily; and we shall watch the effects with much interest. But, even should the result be negative, it will by no means prove that the lesion is not primarily syphilitic; for while, by means of mercury, we can dissipate existing syphilitic manifestations, we cannot expect to influence the secondary non-syphilitic changes which are apt to ensue in the surrounding tissues.

[SEQUEL OF THE CASE.—The treatment was commenced upon January 29th, 1882, and was continued for ten days (one ounce and two drachms of mercurial ointment having been used in that time), when it was suspended, owing to the gums being slightly affected. On February 10th, three days after the mercurial treatment was stopped, an examination of the patient was made. He told us that the fullness and discomfort in the head, of which he complained, had entirely disappeared, and altogether he felt quite a different man. The unilateral sweating, though still present on excitement, was a good deal less pronounced; the anæsthesia, tested as before, was found to be entirely gone; and the paralysis was very greatly improved, as he had much more power in the leg, and could walk a great deal better; and the dynamometer with the right hand now registered seventy kilogrammes (instead of thirty-five before the treatment was commenced). And what is very remarkable—and the explanation of which is very difficult to understand—is, that there is a very considerable improvement in the rigidity, although the patellar tendon-reflexes are still exaggerated.] The treatment above mentioned was to be continued, but as the patient left the hospital the further progress of the case is unknown.

THERAPEUTIC EFFECTS OF HYOSCYAMINE.

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[Communicated by the Director-General of the Medical Department of the Navy.]

HYOSCYAMINE has been in use in this hospital for more than two years, and its effects have been the subject of careful observation on the part of Dr. Duncan Hilston, the principal medical officer, and myself, during that time. At his suggestion, I have drawn up the following account of its use, dose, and mode of administration. The views set forth are, therefore, the outcome of our combined observation, and of notes made from day to day in the hospital records. The report will summarise, as shortly as possible, the therapeutic experience of this alkaloid which has been gained, pointing out the dangers and difficulties met with in its use, as well as the good effects which have seemed to follow from its administration. A few typical cases will be selected to illustrate its suitability and action in certain excited conditions of insane patients.

The dose and mode of administration of such a powerful alkaloid first demanded most careful consideration. Numerous notices of the use of hyoscyamine have appeared, from time to time, in the current medical literature; but the dose given or suggested has varied in the most startling way, from one-hundredth to three-fourths of a grain, or even a grain; while important and equal results have been supposed to follow each of these extreme doses in the hands of different prescribers. Then, again, no solution of a recognised and accepted standard strength had been decided on. Every writer tried to find for himself what was most convenient.

The form of the alkaloid used here has been, invariably, Merck's crystalline hyoscyamine. In the earlier instances, it was used in a solution of one grain in two hundred, administered by the mouth, in gradually increasing doses, beginning with one-hundredth of a grain. No observable effect was produced until one-twentieth of a grain was given at a time, and no very marked effect followed such a dose. It was, therefore, determined to adopt a solution of more convenient strength, and one more in harmony with the common pharmacopœial alkaloids—namely, four grains to the ounce. The following formula for its preparation was brought into use, and has been found to meet every requirement as to strength, but lacks stability: Hyoscyamine (Merck's crystalline), four grains; glycerine, distilled water, of each half an ounce; carbolic acid, two minims; dissolve without heat. Dose, four to eight minims, given hypodermically.

It is very important to make the solution without heat, as heat renders the alkaloid nearly inert. Hyoscyamine is a most unstable alkaloid, and soon decomposes; so that the strength of any solution yet devised cannot be depended on for more than a month after its preparation. With this solution, some satisfactory results were obtained;

but, before giving one or two instances of this, it may be well to place on record the dangerous experience gained in cases where large doses were given by the mouth. The effects of the hyoscyamine, when so administered, varied much, both as to the time before it appeared, and also as to its intensity and duration. This uncertainty of action was found to depend on the state of the digestion: If the alkaloid were given shortly after a meal, the effect was slight and transitory. Not recognising this, at first, the dose had been gradually increased till half-a-grain was reached. As patients seemed to bear large doses well, an attempt was now made to prepare a special solution, for hypodermic use, of equal strength with the pharmacopœial hypodermic solution of morphia—namely, five grains to the drachm. A solution of this strength could only be made by the aid of heat; and, as this rendered the alkaloid nearly inert, the attempt was not repeated, especially as further experience showed such a solution to be unnecessary.

CASE I.—An useful lesson was taught by the case of William S., aged 36, a bandsman, who had been an inmate of the asylum for the last eight years, suffering from chronic mania, with occasional outbursts of violence. On March 9th, 1881, he was very violent and destructive, and refused his breakfast. At 8 A.M., he was given one-fourth of a grain of hyoscyamine by the mouth. By midday, his pupils were widely dilated, and he had become quiet. This quiet gradually deepened, though he did not sleep; and by 6 P.M. he was almost powerless, unable to stand without assistance, hardly able to move his hands or to speak. His breathing was unaffected; but his pulse had fallen from its usual frequency of 75 to 50, and was, in addition, very weak; while the temperature in the axilla was only 96.2°, his ordinary range being 97.6° to 98.4°. His extremities were cold and clammy. His throat, so far as could be made out, was moist; at least, he could swallow with ease. This state of affairs was serious, and the cause of grave anxiety for a time. He was placed in bed, and hot-water bags applied to his feet, and an ounce of brandy with hot water and sugar was given. The extreme effects of the hyoscyamine gradually passed off, and by 10 P.M. his pulse and temperature had again become natural. He slept all night, and awoke in his usual state, except that his pupils remained dilated for forty-eight hours, and during that time he was disinclined for exertion. He has not been violent since, though his chronic mania continues.

In this case, the dose of hyoscyamine was, beyond doubt, too powerful, and was followed by dangerous symptoms of collapse, from which, fortunately, the patient recovered; but the experience gained acted as a grave warning, and called attention sharply to the risk incurred in using such large doses of this powerful alkaloid. As larger doses had been given with impunity, it was assumed that the unusually energetic action of the drug in this case depended on the state of the stomach, as regards digestion, when the medicine entered it. The stomach was empty, as the man had refused his breakfast. This experience, and another similar one, where the symptoms were nearly as alarming, decided the point in favour of smaller doses, given by the hypodermic method.

CASE II serves to illustrate some points in the use of this drug, and may be taken as a type of patient in whom the gain was marked and immediate. C. C., aged 40, stoker, was admitted on November 4th, 1881, for melancholia. From gloomy and silent depression, he gradually passed into a state of noisy and destructive mania, shouting incoherently, throwing himself off his bed, and dashing himself about, till he was much bruised, in spite of constant care on the part of the attendants. His restlessness was incessant, and he passed several days in succession without sleep. The use of hyoscyamine was begun in this case by the hypodermic injection of four minims (one-thirtieth of a grain) of the solution mentioned above. This was continued twice daily for several days, without any marked effect except that of moderately dilating the pupils. The drug was then omitted for twenty-four hours, at the end of which time his pupils had contracted to their usual size. As such a dose was not sufficient to control or moderate the restless violence of this patient, it was increased to eight minims (one-fifteenth of a grain), given hypodermically at 6 P.M. In fifteen minutes, his pupils began to dilate, and, becoming quieter, he lay down in bed. Just before this, he had been jumping about the ward, resenting and resisting all persuasion to remain quiet or lie down. At 10 P.M. he was sound asleep, his pupils widely dilated. He could, however, be easily roused, but went to sleep again on being let alone, and slept for seven hours, and when he awoke his pupils had begun to contract again. He remained during that day quieter and more easily managed than he had been for a long time. The effect of the drug passed off in about twenty-four hours. We had now got the measure of this patient's power of resistance to the drug, and were thus able to regulate the dose in accordance with his seeming requirements. Often, from a restless, noisy, and destructive condition, he passed, while under

the influence of the alkaloid, to a quiet and tractable state, easily managed by day, and obtaining several hours' sleep by night. Indeed, the soothing influence of the drug sometimes lasted for days; but at other times the nervous commotion seemed to get the better of the drug in about twelve hours, in which case an injection of eight minims (one-fifteenth of a grain) was given, night and morning, with the effect of procuring quiet and comfort both to himself and those about him. His excitement came on in periods, and during their continuance quiet and rest were secured by the use of hyoscyamine, without apparent injury to the patient. The drug was omitted whenever the excitement was only moderate; sometimes he would go for days without it, and the dose was occasionally reduced to four minims, when that dose seemed sufficient to mitigate his violence. In this case, the effect of the alkaloid could be depended on and foretold almost with precision, if the drug were given by the skin; while, if administered by the mouth, there was an uncertainty both as to period of onset, duration, and degree of effect. It had, however, no curative power beyond the calming and soothing influence, which no doubt exerted a conservative effect on the patient's strength. As the excitement passed off, calmed and soothed by the drug, sleep seemed naturally to follow; he was disinclined for further effort, and, as in a child tired out with its own boisterous play, mind and body sank to rest.

CASE III.—C. S., aged 48, pensioner, suffering from general paralysis of the insane, was in that troublesome condition of unceasing motor activity often seen in these distressing cases, where they cannot keep still. He was most difficult to manage, full of delusions, yelling to have his head cut off, attacking or making darts at the other patients, pushing about and upsetting the furniture, tearing his clothes to shreds, jumping up the walls to reach the pictures, destroying everything on which he could lay hands, feet, or teeth; a perfect demon of destruction and unrest. Yet, on standing beside him, gently and firmly pressing him into a seat and remonstrating with him on his conduct, he would be recalled to his saner self for a moment, and, looking up, would seem to recognise for an instant the realities around him, and bursting into tears, describe only too well his own helpless condition in the piteous cry, "I cannot, cannot help it." In a second, he would be off again, and so from day to day. He was calmed and controlled by hyoscyamine; and it is noted that, in twenty minutes after the injection of eight minims (one-fifteenth of a grain), from the state above described, his pupils had become dilated, and he allowed himself to be dressed and remained quiet, not asleep, able to take his own food, and, on being placed on the closet-chair, passed urine. It will thus be seen that he was not rendered helpless by the drug, since he was able to feed himself and passed urine on invitation to do so. The effect of the hyoscyamine on the pupils had nearly passed off in twenty-four hours, but he remained quieter and more easily manageable for two days. So far as could be made out, no dryness of the tongue or throat followed such a dose. Often, one-thirtieth or one-fifteenth of a grain was sufficient to calm, control, and soothe this patient when he was otherwise nearly beyond the control either of himself or others. In this case, and in some similar cases, such a dose has been repeated every day, or every second day, for a fortnight, without any observable ill effects, but with great apparent gain to the patients who were, previously to its use, being rapidly exhausted by their restlessness and unceasing exertions.

CASE IV.—J. G., aged 34, is an example of its administration in acute mania. This patient was admitted from the Royal Naval Hospital at Plymouth, on May 4th, 1882. Eight men were required to remove him from Plymouth Hospital to the railway station. On admission at Yarmouth, he talked incessantly, raved and stormed in the foulest language. He was full of delusions without system or coherence. "He was a king, a duke, etc. God directed him to fight with people, with every one." And he instantly proceeded to obey the order, attacking every one about him. He was at once given eight minims (one-fifteenth of a grain) of the hyoscyamine solution by the skin at 9 P.M., and in twenty minutes he was quiet, and, with a little pressure, undressed, went to bed, and slept soundly all night. Next morning, May 5th, he was much quieter, and was able to walk in the square with an attendant, but he again became violent, and had eight minims at 11 A.M.; after which he remained quiet till 8 P.M., walking in the square, and quietly talking of his delusions. As he now became violent again the dose of eight minims was repeated, and he fell asleep in half an hour, sleeping till 2.30 A.M., May 6th, when he started up in terror of being murdered, and attacked those about him. He was partially quieted, and reassured by the presence of the medical officer, who repeated the dose of hyoscyamine at 3 A.M.; this was followed by sleep till 7 A.M. At 11 A.M. the alkaloid was given in a like dose, as he had again become violent. He was then taken into the open air, where he gradually became quiet, and walked up and down with an attendant. He had thus thirty-two minims, or a little over a quarter of a grain of

hyoscyamine in twenty-four hours, viz., from 11 A.M. on 5th May till 11 A.M. on May 6th, with the result of calming and controlling his actions and ideas, for the latter even seemed to be moderated by the drug. He took his food well during this time, and did not appear to suffer from dryness of the throat. It was now determined to omit all medicine and try to manage him without drugs, and carefully note the result. No medicine was therefore given during the remainder of the 6th, 7th, 8th, and part of May 9th, and he was allowed to wander about the exercise-ground with every appearance of restraint removed. His violence was, however, often extreme and his language foul, abominable, and blasphemous beyond description; he only slept for a few minutes at a time, while a look of terror and haggard anxiety deepened on his face. On May 9th, at 10 P.M., a hypodermic injection of ten minims of the hyoscyamine solution was given. In half an hour he was asleep; he slept well all night, and awoke with a refreshed look he had not shown for days. As the hyoscyamine appeared to act so beneficially, it was continued from time to time, as his sleeplessness or violence required to be overcome. The dose was increased to fourteen minims on one occasion, when his violence was greater than usual. He had been dashing himself about and screaming for hours, but on this occasion the drug failed of its usual effect, for he still made feeble efforts to shout at or strike those about him though fully under the influence of the drug, as shown by his widely dilated pupils and staggering gait. On this occasion, too, his tongue and throat were dry; but whether this was caused by the hyoscyamine or by his continuous screaming, it is not possible to decide. Each probably had its share. He was still under his delusions, but in a dull, sleepy kind of way. He would start up occasionally as if irresistibly impelled by his mania, yet sinking down instantly, incapable of carrying out the intended action, or, it may be, the idea had vanished ere grasped. Hyoscyamine was finally omitted on May 18th, as he gradually became more manageable, his mania assumed a less pugnacious type, and he slept better at night.

Since hyoscyamine has been brought into use in this hospital, frequent efforts have been made to note accurately the effects of the alkaloid on the pulse and temperature. No trustworthy observations could, however, be made on patients in the state of those just related. But, from clinical observations here, some other practical lessons may be drawn.

1. The observations show the uncertainty of the action of hyoscyamine when given by the mouth, and the danger of large doses.

2. They also show the marked superiority of the hypodermic method, and the confidence with which, in some cases, its effects could be calculated on, and the dose increased or diminished in accordance with the violence of the patient.

3. In hyoscyamine, we have a drug which is often capable of controlling the violence of a furious maniac, and, it may be, checking the torrent of rushing ideas on which he is borne along, soothing without putting him to sleep, and, in these respects, differing from morphia or chloral. In noisy and destructive general paralytics, such as indicated in Case III, the quiet air of comfort and repose following a moderate dose was such a contrast with the previous condition, as to strongly impress every one with the feeling that, by the introduction of hyoscyamine, another valuable aid had been secured in the care and treatment of such cases.

4. No curative action can be claimed for the drug. Even in acute mania it did nothing more than moderate or check, for a time, the violence of action, and, perhaps, render less vivid and overwhelming the terrifying whirlwind of delusion of the frantic patient.

Previously to procuring a supply of hyoscyamine, the ordinary tincture of hyoscyamus was given in large doses, sometimes as much as one ounce at a time, without much effect, except that of dilating the pupils; but it had no controlling power in cases which afterwards yielded to the more powerful alkaloid.

THE HOMOLOGIES OF THE LONG FLEXOR MUSCLES OF THE FEET.—In a paper read at the recent meeting of the British Association, Dr. Dobson dealt with the homologues of the following muscles of mammalia:—Flexor Digitorum fibularis=Flexor hallucis longus; 2. Flexor Digitorum tibialis=Flexor Digitorum longus; 3. Tibialis posticus. He explained by means of drawings how these muscles partially or totally supplanted one another in different animals. From the examination of a large number of animals, he found the flexor fibularis existing in all, and exhibiting but few modifications, while the other two were subject to much variation, or might be absent. He deduced from his dissections that the variation of the flexor tibialis had not been properly understood, its real homologues having been named tibialis posticus accessorius secundus, or internus, while it was supposed the muscle had undergone fusion with the flexor fibularis.