proximal ends to the cut proximal ends of the dorsal nerve-roots previously divided, thus—

A corresponding junction was also made in the left side. It was hoped that by so doing a path might be provided for the possible transference of nerve impulses—afferent, efferent, and trophic—across the gap caused by the crushed portion of the cord.

The patient recovered from the operation and the wound healed. He remained in the hospital until June 24th, when he left for his home, where he died seven weeks later, and unfortunately no *post-mortem* examination was obtained. During the three months of his stay in the hospital there was no evidence of any return of voluntary movement, though there was a transitory alteration in the level of the anaesthetic area. The bladder condition remained as before.

I have not previously recorded this case as I felt that some preliminary experimental observations on animals were necessary. These Mr. Kilvington has now undertaken.

I am of course aware that the operation performed by him on dogs was undertaken with the object of establishing a direct connexion between the cord above the level of the sacral nerves and the peripheral nerves innervating the bladder and rectum, and that successful innervation of these viscera was thus brought about. The question arises whether, in addition to the possibility of successfully re-establishing this direct innervation of viscera in the human subject, it may not be possible by nerve anastomosis to provide a by-pass for the transference of nerve currents from the portion of cord above the crush to that below and vice versa. The question of the position of the nerve section and anastomosis in reference to the posterior root ganglion is, as Mr. Kilvington points out, very important. In my case the nerves were joined within the thecal canal.

MORPHINOMANIA TREATED SUCCESSFULLY WITH ATROPINE AND STRYCHNINE.*

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DURING the past year I have been treating a case of morphine habit of over thirty years' standing, and as I believe that he is now completely cured I think that a description of the case and the treatment pursued may interest you.

He made his first acquaintance with the drug through joining an opium-smoking club in London, and soon began to appreciate the brilliancy and activity of thought that it caused, and then to use it systematically to further him in business. In about four years the craving had become established. He made many voluntary efforts to free himself from the habit, but without success; on one occasion he placed himself in the hands of a medical man, who relieved the craving to a certain extent, but in about a year and a half he broke down again. He also became an alcoholic in his endeavours to stave off the stage of depression, but during the past few years he found that alcohol had not the desired effect, often making him even more depressed, and so he has taken less than formerly.

His usual allowance of opium latterly had been two wineglassfuls of laudanum in the day, and when he had to get on without it he felt intensely irritable, restless, and miserable. He slept wretchedly, he says hardly an hour in the twenty-four, and that little disturbed by flashes of light, sounds of bells, and by people coming up the

stairs and into his room, and, when he was very bad, close up to his bed, causing him intense terror.

His appearance was not typical; instead of being emaciated and having a pale, pasty complexion and dilated pupils, he was stout, indeed somewhat corpulent, had a high rather congested colour, and his pupils were contracted though not to pin points. His expression was wild and staring, his gait shuffling and uncertain, and his manner restless; intention tremors were present in writing and other fine movements, and he was subject to short lapses of memory. His disregard for his appearance and dress was like that of the chronic drunkard, and he was hardly able to earn sufficient to keep him from want. When I first saw him he had been without opium for a fortnight, he was intensely miserable and depressed, had been practically without sleep for some nights, and had intense headache. He told me that if I could not give him relief from his misery there would be nothing for him but to do away with himself.

What books I have been able to consult on the subject agree that the essentials of treatment are complete rest, careful dieting, thorough supervision and gradual withdrawal of the opium.

In this case none of these were available; he was in lodgings where I could not exercise any control or supervision, he had to work for his scanty living, and, as I found out a couple of months later, was often in want of the bare necessities of life during treatment.

The drugs recommended are many and varied and of widely differing physiological action, such as strychnine, cannabis indica, valerian, caffeine, bromides, sodium phosphate, atropine, and coal-tar derivatives. I had read in Dr. McBride's article on the treatment of alcoholism, published in the BRITISH MEDICAL JOURNAL in April, 1904, that he considered the hypodermic administration of atropine and strychnine to be beneficial in the treatment of morphinomania as well as of alcoholism, and, as it had proved successful in my hands in the treatment of alcoholics, I determined to give it a trial in this case.

I began with atropine sulphate $\frac{1}{100}$ grain and strychnine nitrate $\frac{1}{60}$ grain three times a day, increasing as rapidly as he would bear, till on the eighth day he got atropine sulphate $\frac{1}{60}$ grain and strychnine nitrate $\frac{1}{60}$ grain, but I had to reduce the atropine to $\frac{1}{100}$ grain in a short time. I also prescribed a cinchona mixture, but he did not take this regularly or for long.

The treatment benefited him immediately, and the first thing he noticed was relief from headache and improvement in his rest at night. The effect here was curious and interesting; he had been disturbed and frightened by sounds of bells and by people entering the room and coming close to him. After the first day the bells sounded fainter and the people only came to his door; the next night he hardly noticed the bells and the people seemed to be on the stairs, the next night in the hall, and then they ceased to trouble him. By the fifth day he felt a distaste for alcohol and was distinctly less miserable, and by the fourteenth day had not the slightest desire for opium, was quite hopeful, and beginning to take some interest in his appearance; his gait also had improved; he had lost the wild, staring expression, and was getting two to three hours' refreshing sleep at night.

It is recommended that opium should be withdrawn gradually in order to avoid as far as possible the usual distressing attacks of vomiting and diarrhoea. In this case it had been withdrawn suddenly and completely, and on the fourth day of treatment he complained of nausea and vomiting, and the next day of diarrhoea. These caused him great suffering as time went on; he was sometimes disturbed eighteen and twenty times during the night, and the vomiting was so violent as to cause haemorrhage. His weight diminished rapidly, and at one time he became so weak that I was somewhat alarmed at his condition.

Morphinomaniacs are said to bear atropine better than alcoholics, but I did not find it so in this case. Early in June I reduced the dose of atropine, and on June 20th stopped it altogether, but kept up full doses of strychnine for some time longer on account of his weak condition. By the end of June he was putting on weight again, his memory was improving rapidly, he slept soundly for about four hours each night (nearly his normal amount), had lost all abnormal depression, and took some pride in

* Read before the South-Eastern of Ireland Branch of the British Medical Association.

his dress. Since then he has improved steadily in every respect, he has regained what he lost in weight, notwithstanding attacks of diarrhoea and vomiting when the weather is cold or he is worried; he can do a full day's work without distress, is neat and clean in appearance, and has had no return of craving for opium or for alcohol.

It seems to me that this case illustrates how very strong an effect atropine has as an antidote to opium. Every circumstance was against the success of treatment except the patient's own earnest desire to be cured. I have seen him frequently since treatment was completed, and feel satisfied that so far it has been perfectly successful, and promises to prove permanently so.

THE PHYSIOLOGICAL ACTION OF WHISKY ON THE CIRCULATION.

BY

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THE action of alcohol upon the circulation, and more especially the influence which it exerts in diseased conditions has long been a subject of dispute. Briefly it may be stated that two views have been advanced: (1) That alcohol in suitable doses acts as a stimulant; and (2) that the action of alcohol is always depressant. The supporters of both views agree on one point, namely, that to a certain extent alcohol is burnt up in the body tissues, and thus to a limited degree acts as a food.

Although these views are still under dispute, it seems from the careful investigations of recent observers that the statement regarding the depressant action of alcohol upon the highest nerve centres is probably correct.

As regards the effect of alcohol in medicinal doses on the blood pressure, it is generally held that in healthy individuals there is practically no action. The elaborate investigations of Cabot upon a large number of patients suffering from enteric fever show that any influence which alcohol exerts in this disease upon the circulation, respiration, and excretion of urea is of a very transitory nature. The same point is brought out in the recent work of Martin Kochmann.¹ It is not meant, however, that alcohol has no action upon the circulation, as witness, for example, the cutaneous flushing which it produces. Still the general pressure is not lowered, and therefore there must be another effect produced in some other vascular region. To account for this apparent slight action, Meltzer² has suggested that probably a constricting influence is exerted on the vessels in the area supplied by the splanchnic nerves—that is, within the abdominal cavity. Alcohol, according to this observer, does good in so far as it leads to a redistribution of the blood in diseased conditions.

Very little is known about the action of the various wines and spirits commonly used in practice as compared with that of pure alcohol, with which the pharmacological experiments mentioned above have been carried out. In this country the favourite alcoholic stimulants are whisky, brandy, port wine, and champagne, and of these probably whisky is most frequently employed. It is, therefore, of interest to know (1) what is the nature of its action, and (2) whether it is a generic action, or whether it depends on the character of the whisky employed. A recent law case in England has shown that, technically, there is a difficulty in determining what constitutes whisky. In Scotland it is popularly understood that pot-still whisky is the true product, and that patent still products are not genuine whiskies. The pot-still whisky is more complex in its character, and contains secondary ethereal products which may conceivably alter the alcoholic action; whereas the patent-still product is a much purer substance, and is much more cheaply produced. Our attention was drawn to this question by the somewhat irrelevant evidence adduced to show that there was a distinct difference in action between the two products. One gentleman (not a pharmacologist) stated in evidence that a difference in action could be demonstrated on animals. He said that a pet monkey, when made drunk with pot-still whisky, "behaved like a gentleman," whereas, when intoxicated with patent-still whisky, "its conduct was that of a beast."

A comparative investigation into the action of pot and patent still whiskies seemed the most likely method of determining any difference. With this object we tested upon three healthy men, practically abstainers, the effect produced upon the circulation by corresponding doses of absolute alcohol and of whisky. The action was studied upon the rate of the pulse and upon the peripheral tension as measured in the brachial artery by means of Martin's modification of the Riva-Rocci sphygmomanometer and in the digital arteries by Gärtner's tonometer. The dose given corresponded to 1 oz. of absolute alcohol, and sufficient water was added to make the dilution of alcohol 1 in 4. While no special importance was paid to the mental effect, we may state that as a rule this amount of alcohol produced a distinct sedative action. During the experiment the subject remained seated in a chair and was allowed neither to speak nor move. The investigations were carried out at different periods of the day, and at varying intervals after food. A sufficient number of blank experiments was done to show that under similar conditions without alcohol the alterations in pulse and pressure were almost *nil*. Thus in a blank experiment upon one of the subjects four observations showed that in 25 minutes the pulse-rate only varied two or three beats whilst the pressure in the digital arteries varied to the extent of only a decimal point, ranging between 4.0 and 4.1 as estimated by Gärtner's instrument. The readings of another blank experiment on the same man, in which the pressure was estimated by the Riva-Rocci instrument, were:

Time.	Pressure.	Pulse.
7.16	105	76
7.23	105	78
7.27	106	78
7.37	106	75
7.40	106	77
7.50	105	75

Our control experiments demonstrate that the pulse shows slightly more variation than the blood pressure, but such alterations are very trifling.

The normal variation having been fixed we proceeded to test the effects of drinking 2 oz. of whisky mixed with 2 oz. of water. A typical experiment is reproduced for each form of whisky, all three observations being made upon the same man.

The results obtained on the other two healthy subjects varied only very slightly from those shown in the accompanying table (page 1175). From the three series of observations (several of which were duplicated) composite charts were drawn out for each form of alcohol.

Whisky S has very little action on the circulatory system. The pulse-rate rises slowly from the commencement, then slowly sinks to the former level, or perhaps a little higher. The pressure is somewhat reduced. This whisky has perhaps a greater soporific action than either A or C.

Whisky A in all three individuals caused a slight increase in the pulse-rate within the first ten minutes, followed by a fall to normal or slightly below normal. The blood pressure is seen to correspond with the pulse. When the pulse-rate increases the pressure rises, and vice versa.

Whisky C does not bring about an increase in the pulse-rate. In all three men the pulse-rate is not more frequent, but in all three there is a slight rise in the pressure, as is brought out in the composite chart. In only one instance was a transitory rise of pulse-rate noted, where it was probably due to direct irritation, as in this instance the swallowing of the alcohol brought on a fit of coughing.

Absolute alcohol produces a very constant action upon all three men. No well-marked preliminary increase of pulse is noted. The pulse falls in rate by a few beats, and with this there is a slight reduction in pressure.

In general terms it may be stated that the effect upon the pulse and pressure of all three alcoholic preparations, in the above dosage, is very slight, and that after the first ten minutes practically no difference can be detected