good health, excepting for the last two years, when he had occasionally complained of wind in the stomach. This was always relieved by hot brandy and water, which caused him "to bring up a quantity of wind". I ordered a continuance of the treatment.

Two hours later, his wife came to ask whether there was anything else to be done, as he was still in great pain. I ordered hot poppy fomentations, and the pills every half hour until the pain abated.

I heard nothing more of the case that day, and, therefore, presumed he was better. But when I went the next morning, to my astonishment, I found the patient dead. On inquiry, I learnt that the deceased appeared so much better in the afternoon that his wife only gave the pills every hour; but that in the evening, after straining at stool, he felt faint, perspired profusely, and in a quarter of an hour died.

On hearing this account, I assured the friends that there must be something unusual to account for so sudden a death, and that perforation of the bowel had probably taken place. I therefore desired a *post mortem* examination, which I was permitted to conduct thirty-six hours after death. On examination, the peritoneal cavity was found much distended with fetid gas and fluid, the latter consisting of fluids swallowed, fluid feculent matters and bile. The peritoneum was healthy throughout. In the first portion of the duodenum, there was a large old ulcer, about the size of a sixpence, which had perforated the bowel and opened into the peritoneal cavity. Its edges were thickened, but the adjacent parts presented no signs of inflammation, neither was the peritoneum, even at that part, at all inflamed. The peritoneal aspect of the perforation showed that the ulcer had for some time entirely eaten away all the coats of the bowel excepting the peritoneal, for the flaps of that membrane were distinctly visible. The parts adjacent to the bowel were healthy.

Such is a condensed history of the case; but the fact to which I wish to draw attention is that the patient, who most likely had had the ulcer for one or two years, never presented any specially diagnostic symptoms until the perforation occurred. He never had vomiting of blood nor pain after food; neither was there any history of bloody stools, with occasional attacks of faintness; and up to the very last there were no signs of peritonitis.

Of course, it is a matter of doubt whether the perforation took place before I saw him at his house or whilst straining at stool. I should think the latter, seeing that he appeared so much better in the afternoon, and that when I saw him in the morning there were certainly no symptoms of collapse. So lightly did he think of his pain when he called upon me in the morning, that he only asked me to see him "sometime when passing by"; and, indeed, the very fact of his walking home seemed enough to allay any suspicions of so rapid and fatal a result.

The only case I know precisely similar to this, is one which occurred in the practice of Dr. Barlow, many years since, of a brewer who died suddenly, without any marked symptoms, and in which a *post mortem* displayed an old ulcer of the duodenum, evidently similar to that of my own.

ETHER AS AN ANÆSTHETIC.

By THOMAS SKINNER, M.D., Liverpool.

So far back as July last, I had prepared the following remarks on Ether as an Anæsthetic. The letter in this week's JOURNAL from the pen of Mr. Clover has induced me to precipitate its publication; and all the more so, as Mr. Clover has arrived at the same conclusion as myself as to the best specific gravity of ether for anæsthetic purposes.

Everyone knows how much I prefer chloroform to ether or any other liquid as a general anæsthetic and in midwifery, whilst it is not a long time since I stated my belief in these pages that there are special occasions and operations where ether is much to be preferred to chloroform, namely, in all operations on the eye, head, and abdomen, such as cataract, iridectomy, hernia, and ovariectomy. This being so, it behoves us to ascertain the most convenient form of the drug and the readiest and simplest mode of administering it effectually.

After a number of experiments, I have ascertained that the specific gravity of the ether is of the greatest importance to be attended to. If accurately adjusted ether-inhalers are used, such as Snow's, Squire's, and the like, it matters little about the specific gravity, as the patient is pretty certain to get the entire of the vapour; all that is necessary is that the ether shall be chemically pure. Of course, the only substances affecting the specific gravity admissible are alcohol and water. In other respects, as I consider all mechanical inhalers as cumbersome, not unattended with danger to the patient, and the very reverse of the readiest, simplest, and most economical methods of inducing anæsthesia by means of any drug, I cannot advise their use.

When we come to the simpler and readier methods of inhaling ether, however, the tables are turned. Ether of a low specific gravity is a very great mistake. I have used it from .720 up to .735 (I am certain that it varies a good deal by keeping, especially if it be not kept in a very cool place), and I have no hesitation in declaring that I have given up using any other than that of the *British Pharmacopæia*, which has a specific gravity of .735, and which is spoken of so highly by Mr. Clover. With ether of this specific gravity, the patient gets far more of it with very much less loss; and less of it goes a much greater length. As to the comparative safety of ether according to specific gravity, if alcohol and water are the only foreign ingredients affecting it, it is *nil*, and need not enter into the calculation. I have not used ether made from methylated spirit as yet, but I believe it to be quite as safe as that made from the best rectified spirit; and I should not hesitate to use it, even though "methylated ether leaves an odour after it has evaporated" (Squire's *Companion to the British Pharmacopæia*, 1871).

Among the ready methods of administering sulphuric ether of specific gravity .735—which is the simplest and handiest? If any man have been at the trouble to devise a method, and come to the conclusion that he has succeeded, it is but natural that his own will, in his estimation, eclipse all others; but the world must be the judge, and not he. I am perfectly willing to be judged by such a tribunal in the present instance—as all who have seen my mode of administering ether of any specific gravity, and in particular of .735, are agreed that it is all that can be desired for simplicity, durability, portability, cleanliness, economy, and effectiveness.

Apparatus.—A good sound cork perforated with a glass or metal tube, the same as that of my chloroform bottle, only larger in the bore. The cork must fit an ordinary half-pint or pint bottle, and the tube must be sealed at the point to the diameter of the twelfth or sixteenth of an inch, sufficient to admit of a free and straight flow of the ether from the bottle when inverted. The tube must not be drawn out to a point which is certain to be broken off, but round, and the tube ought not to extend above three-quarters of an inch beyond the cork. A closely fitting cap of cork, or leather, or leather and cork (not India-rubber, as the ether destroys it) might be added with advantage, as it would prevent the escape of the ether in the interval or *en route*. If the tube be made of metal, a cap of the same material will be most suitable. I have generally placed my finger on the end of the tube, but this is not so necessary when the ether is of a higher and more manageable specific gravity, such as .735 of the *British Pharmacopæia*. The bottle, a half-pint or pint, should be of actinic glass, yellow being the best if obtainable, or it may be covered with leather or thick paper of any or no colour (yellow is the most actinic) for the purposes of excluding the light, lessening the chance of breakage and of protecting the ether from the heat of the hand. If covered with leather, a slit or tell-tale should be cut in it in order the more readily to ascertain the amount of fluid remaining in the bottle.

Inhaler.—It is composed of an interior of thick white felt, and an exterior of patent or black enamelled leather. It is altogether close, having no aperture except where it fits over the nose and mouth, which it closes very perfectly, if need be. The enamelled leather cover is reflected for the distance of an inch, inwardly, over the thick white felt, the internal and external surfaces of leather being temporarily stitched through the felt and the two plies of leather to keep all firm. After administration, the stitches are cut or undone, the felt is removed and washed, dried and returned, and restitched ready for another patient, or a second felt may be kept ready for use. I beg here to repeat a rule which I have previously laid down in these pages, namely, that cleanliness and decency demand that no two individuals should be made to breathe through the same inhaling apparatus without its being thoroughly cleansed—a step which is perfectly impossible with permanent mouth-pieces, tubes, and evaporating or air-chambers. The leather cover admits of washing the same as the felt, inside and out. The form of the inhaler is that of "Punch's" nose, seven inches in the longest diameter by five inches. It is a professional black, and folds perfectly flat, occupying the space of a flat and folded pocket-handkerchief.

The mode of using the inhaler is very simple. The ether-bottle being only three-fourths or two-thirds full, pour about half an ounce of ether (.735 *British Pharmacopæia*) into the inhaler, directing it especially on the sides of the felt; then insert the tubed-cork into the bottle of ether. Apply the inhaler over the nose and mouth of the patient, but not too close at first, although the sooner it can be closely applied, the sooner the patient will be anæsthetised. In renewing the ether, lose no time; invert the inhaler and quickly sprinkle the surface of the felt with a free allowance from the bottle; as quickly reapply the inhaler, never giving the patient time to rally from the previous inhalation. At one time, I had the leather cover perforated, so as to enable me to give additional

ether without the necessity of removing the inhaler; but I soon found my mistake, as more vapour escaped through the aperture than was introduced, and the patient took a much longer time to get under its influence. At times, it is advisable to remove the inhaler a little way from the mouth and nose; especially is this advisable after the patient is once fairly off—that is, when it is desirable simply to keep him under. A great deal is said about patients becoming dark in the visage while getting under the influence of ether. I have hitherto observed very little of this, and I cannot help thinking that its occurrence is greatly owing to the unnecessary exclusion of atmospheric air and too large a quantity of vapour being administered at a time. By the apparatus I now recommend, the passage of air is very little impeded, as anyone can learn by applying it closely over his air-passages and breathing. If the patient's countenance should become dark or livid, *give more air by withdrawing the inhaler a little way, say an eighth of an inch or more, and increase the ether vapour by a fresh and free supply.* It is a great mistake to suppose that a patient's respiration can be sustained on the vapour of ether alone; he must have air, and he gets it, whether the observer is aware of it or not. In administering ether, it is well to have no naked flame of any kind in the room. As with chloroform, so with ether, food ought not to be partaken of for at least four hours beforehand. I have no doubt that ether of a still lower specific gravity will do. I have not tried it, but that of .735 is so good that I could scarcely wish a better.

If anyone will try this inhaler and mode of feeding it with sulphuric ether of specific gravity .735 *British Pharmacopœia*, he will soon be satisfied that, for simplicity, durability, portability, cleanliness, economy, and effectiveness, it is not to be surpassed.

The inhaler and cork or bottle are to be obtained from Messrs. Maw, Son, and Thompson, of 11, Aldersgate Street, City; and from Mr. Wood, Church Street, Liverpool.

SOME REMARKS ON THE CONDITION OF THE CEREBRAL CIRCULATION PRODUCED BY STIMULANTS AND HYPNOTICS.

By HERBERT L. SNOW, M.D. Lond., Bayswater.

It appears to me that the science of therapeutics is at present much impeded by the want of a rational system of classification; and also by the vagueness of the general terms in ordinary use: that when men speak, for example, of a stimulant or narcotic, their ideas of what constitutes a stimulant or narcotic, of the essential feature in the stimulating or narcotising process, are more or less hazy and empirical. Since Dr. George Johnson's discoveries have directed attention to the contractility of the arterioles, it has become obvious that nearly all our drugs (excluding those prescribed merely for their chemical affinities) produce their effects upon the body—of course, through the agency of the nervous system—by the alterations they induce in the calibre of these vessels. The fact is one which it is especially important to bear in mind, in the case of remedies which affect the functions of the brain or spinal cord; inasmuch as, by empirically administering such potent agents, we are sure occasionally to do harm; and, as it is of the highest importance to form definite ideas of the influences that are brought to bear upon parts of such extremely sensitive and marvellously complex organisation, I venture, in the present paper, to offer a few suggestions upon this topic, hoping that, if my views are erroneous, they may be speedily corrected by some one qualified to pronounce upon them authoritatively.

Premising that the arterioles are dilated by the vaso-motor nerves, which belong to the cerebro-spinal system, and contracted by the fibres of Remak (sympathetic), I will first notice the medicines, which are commonly called stimulants, and which agree in producing exhilaration of the mind, a genial feeling of warmth throughout the body, and increased force and frequency of the heart's contractions. The primary and essential feature of this process, I take to be dilatation of the arterioles (*note the flushed face*), to which the increased energy of the heart is but secondary, following as a necessary sequence.

If the dilatation be slight, the vessels soon return to their normal condition; and the above is all that is necessary to the action of a pure stimulant. Tea, coffee, and guarana seem to be the purest we have; most of the others, as alcohol and opium, are only purely stimulant in small doses. After a larger dose, that is, after a greater dilatation of the arterioles, a train of other symptoms succeeds; and the former stimulant now becomes either a hypnotic or a narcotic. Either the dilatation gives place to contraction; when the previous excitement is followed by healthy sleep, in which the essential feature is a moderate and sustained contraction of the cerebral arterioles, lessening the supply of blood, and so of oxygen, to the nerve-tissue. Or, secondly, if the

dilatation be extreme or protracted, a state of abnormal sleep or *coma* supervenes; when, although the vessels are widely dilated, the blood moves sluggishly through them, its ordinary chemical properties being at the same time more or less modified.

To the last, when not fatal, succeeds another stage, indicated by the headache following a debauch. There is now pallor of the countenance; the vessels are slightly contracted, and their muscular walls have lost their tone. A repetition of the stimulant dose speedily relieves the prostration, but may aggravate the headache; this being apparently due to distension of the veins, which, dilated by the previously accelerated blood-current, do not readily recover their former calibre, when the *vis à tergo* is removed, supposing the latter to have been protracted. Alcohol and opium furnish us with the most familiar examples of this train of events.

Respecting the phenomena of sleep, I believe that much uncertainty of thought and of language prevails in medical works—at least, so far as regards artificially induced sleep. It was long since proved that, during healthy slumber, the brain is anæmic; in other words, that the arterioles are contracted. Yet, it seems to be generally thought that opium acts as a hypnotic by causing venous congestion. As sleep is dependent upon a diminution in the supply of oxygen to the brain-tissue, it is manifest that the veins cannot have any share, at least primarily, in its causation. The arterioles alone regulate the quantity of oxygenated blood which is supplied to the cerebral or to any other tissue, and are the sole agents to be regarded in examining these phenomena; although it is true that, in the case of a mechanical impediment to the circulation, the veins would exert a retrograde influence upon them. As a general rule, congestion of the cerebral veins would cause headache, but not sleep. Opium, therefore, acts as a hypnotic by contracting the arterioles; and it is worthy of note, that the face is at first pale in cases of poisoning by this drug. As has been already explained, however, after a very large dose, the arterioles may be dilated, with the current greatly slackened, and the blood chemically altered. *Post mortem* venous congestion is not constantly present, and only indicates the prolonged action of a stimulant.

So also in slumber brought on by chloral or by bromide of potassium, the same condition of the arterioles obtains; and these medicines have been found experimentally to contract the vessels in the frog's foot. They differ, however, from opium in the absence of a primary stage of stimulation; and hence their use is less frequently followed by headache. They, besides, do not check secretion, and so do not interfere with the purification of the blood by the excretory organs. In some cases, nevertheless, chloral has a marked stimulant effect. Both these drugs cure ordinary headache by contracting the arterioles, and thus shutting off a portion of the blood-current from the already distended veins, so as to give these last time to empty themselves. In sick-headache, when we have violent action of the sympathetic, and when the pain is neuralgic and due to the suddenly increased tension of the arteriolar walls, they usually fail; then guarana, strong tea, or alcohol, which dilate the vessels, prove effectual. Probably nitrite of amyl would afford speedy relief, but I am not aware of its having been tried in megrim.

Of medicines which more especially affect the functions of the spinal cord, belladonna in moderate doses contracts, while strychnia dilates the vessels. In large doses, belladonna also has the latter effect, when flushed face, intoxication, and occasionally trismus, supervene.

A good many experiments have lately been made with numerous remedies, by injecting them subcutaneously, apparently under the impression that the effect would thus be different in some way from the ordinary symptoms which follow their absorption through the alimentary canal. Although, when the drug is not such as to cause any local mischief, we administer it by this method with greater precision and celerity, still I would venture to point out that in the case of morphia, which may serve as a type, the effects are identically the same as would follow a dose given by the mouth, excepting only a mitigation of those caused by its actual contact with the alimentary canal. It is obvious, therefore, that with drugs which do not occasion embarrassing gastric or intestinal symptoms, the use of the hypodermic method will rarely be attended by any special advantages.

I trust the day is not very far distant when we may be able to predicate of all the medicines we employ, not only what each is expected to do, but also by what peculiar channel it effects this result. When we have attained absolute certainty upon these points, and when the vast multitude of compounds called into existence by organic chemistry—a field which has already yielded rich results to investigations of comparatively trifling extent—have been pressed into our service, then medicine will take its place among the exact sciences, and the healing powers of its professor will become, what is certainly very far from being the case now, a true measure of his scientific knowledge.