

may be produced, because we know that it causes death in the lower animals. In these the first effect is great restlessness; the animal sneezes, and struggles to get away; the respiration becomes quickened and fuller, and occasionally stops. These respiratory troubles cannot be considered as a specific symptom of the intoxication by nitrite of amyl; they are more probably due to direct irritation of the bronchial passages: besides, the injection of any liquid whatever into a vein generally produces a sense of oppression, and acceleration of the respiratory movements. The action of the heart becomes equally increased, and the thoracic wall is visibly moved by its strong pulsations. Following this are alternating tonic and clonic contractions in the extremities, and even in the face; then episthotonos, shivering, involuntary exertions, vomiting, and coma. Post-mortem results are not very marked, except the dark colour of the blood, and the dilated engorged heart; death being produced, apparently, by paralysis of this organ.

The method adopted for the administration of the nitrite of amyl is of great importance. The means by which the toxic effect is produced most quickly is by injection into a vein; the symptoms show themselves immediately, and rapidly pass off. It is surprising to note the amount of urine passed by the animal immediately after such an injection, although the bladder may seem to have been completely emptied but a few moments before; this occurs with each injection. It would have been of interest had a chemical analysis of this urine been made; but this was, unfortunately, omitted. By inhalation death can be produced by a comparatively smaller amount; though the symptoms are not so marked, and the inhalation must be continued for some time in order to produce external manifestations. By hypodermic injection the substance reaches the blood so slowly that it produces but little effect, the elimination taking place so rapidly that there is not at any time a sufficient quantity in the organism to produce the characteristic symptoms. As for the digestive tube, it seems to possess no decided advantages, but to be on about the same footing as the subcutaneous injection. The administration by inhalation being more energetic, and at the same time watched with facility, it is natural that physicians should have unanimously preferred this to its internal exhibition, which has been abandoned. Following the administration of the nitrite of amyl, there is a marked decrease in the intervascular pressure, as shown by the manometer in all the experiments. There is also a constant dilatation of the capillaries, or, more properly, the fine arterial ramifications, which was not seen in the fine venules, and was but partially found in the capillary network proper.

This dilatation is evident soon after the inhalation is commenced, increases sometimes to double the calibre of the vessel, and, after a certain time (fifteen to twenty minutes), diminishes again, whether the inhalation is continued or not. This contraction continues until the vessel is smaller than before the inhalation. If the experiment is repeated, the phenomena are reproduced, but not rapidly. There is also a constant slowing of the capillary circulation, which follows

the dilatation, and may be due to the lessening of the pressure. During the muscular spasms of the animal, the dilated vessels become momentarily smaller, and the circulation more rapid; but when the animal becomes quiet the effect of the nitrite of amyl is re-established.

The lowering of the blood-pressure and the capillary dilatation could only be produced simultaneously by an intervention of the vaso-motor nervous system, central or peripheral, or by automatic changes in the walls of the vessels. A weakening of the heart's action cannot be considered as the cause, for that alone would not produce capillary dilatation: this must therefore precede the lowering of the tension, which would be the natural consequence of such dilatation.

A toxic effect upon the vaso-motor centres in the medulla would naturally appear to be the explanation of these phenomena, because direct or reflex irritation of that ganglion produces a diminution of the tonicity of the walls of the vessels. The nitrite of amyl is able to act in two ways upon the vaso-motor nervous centre: either by being brought by the blood directly in contact with that important organ, or by reflex action from irritation of the peripheral nerves. The limited extent of this nervous centre, and the small amount of blood conveyed to it, exclude the first hypothesis, while it is easily seen that by irritation of the peripheral ramifications of the pneumogastric, or some other nerve, the nitrite of amyl may produce a reflex irritation of the vaso-motor centres, and hence a diminution of the tonicity of the vascular walls. Two alternatives remain: either that the peripheral extremities of the vaso-motor nerves are affected, or the intimate muscular fibre of the vessels; but, as this leads us to the vexed question of muscular irritability, which we prefer not to discuss, we will merely state the fact that under the influence of nitrite of amyl constant dilatation of the pupils does not occur, which demolishes the theory of Brunton, who argued that from this dilatation we might infer a similar action in all the unstriated muscular fibres. Let it be the one or the other, the blood is really the irritating medium; and, rather than admit a direct action of the nitrite of amyl, which is not probable, we are disposed to take into consideration its chemical effect.

We know that it acts energetically in preventing the oxidation of bodies, and particularly that of the blood, also interfering with the elimination of its carbonic acid. This is corroborated by the post-mortem appearance of the heart and the arteries, which are filled with very dark blood. In conformity with the theories now generally admitted, this blood charged with carbonic acid, by strongly irritating the peripheral vaso-motor nervous filaments or the muscular fibres themselves, might rapidly induce a condition of paralysis leading to dilatation. In company with a certain distinguished physiologist, we adopt the theory that there are two species of muscular fibres in the walls of the vessels. The nitrite of amyl produces an irritation of those fibres which preside over dilatation, while those that govern contraction are unaffected by it.

The acceleration of the heart's action depends upon the capillary dilatation. In those cases

where it is very marked, as after a large injection into a vein, it is possible that the ganglia which give to the heart is automatic motion are also affected by it; and, if it be pushed too far, death may supervene from paralysis of the heart.

The therapeutic employment of the nitrite of amyl is based upon these facts, and is particularly indicated where there is probable spasmodic contraction of the capillaries. If it has not always answered to the expectations of those who have used it, it is because it has often been improperly employed. Resting on a physiological basis so clearly defined, the new remedy holds an elevated position at the side of digitalis; and we hope that new experiments will soon be made to determine under what circumstances the physician may employ it with success, so as to contribute towards obtaining for it the right of introduction into the *Materia Medica*.—[Phil. Med. Times.

SURGERY.

ABSCESS OF THE LARYNX SIMULATING CROUP.

Dr. William Stephenson, narrates (*Edin. Med. Journ.*, October), 1873, six cases of suppuration in the neighbourhood of the larynx; three belonging to Dr. Stephenson, one to Riiliet and Barthes, and two to Dr. Parry (*Philadelphia Med. Times*, June 14, 1873). All the patients were children; in age varying between nine weeks and four years and a half. The most striking symptoms are those present in all cases of acute glottidean obstruction—laboured stridulous breathing and hoarse cough. Hence the disease in question strongly resembles croup. Yet in laryngeal abscess these glottidean symptoms are not usually so rapid in development, and in reaching the point of suffocation, as is the case with true croup. In one child laryngeal dyspnoea lasted two weeks. Usually the patient breathes most easily in an erect posture. Besides dyspnoea, dysphagia was present in all cases but one; this is a symptom which recalls retropharyngeal abscess. But the dysphagia does not seem to have been so great in the laryngeal as it is in the pharyngeal abscess; he finds no mention of return of fluids through the nose. Sooner or later, a deep-seated swelling may be detected in front, or at the side of thyroid cartilage. When this is opened, pus escapes. At *post mortem* examinations, pus was found spreading upwards along one or both sides of the thyroid cartilage to the parts above the *rima glottidis*. In four cases, the suppuration about the larynx was preceded by inflammation of the lymphatic glands under the jaw and down the neck; in two cases it is mentioned whether these glands were inflamed or not. The lymphadenitis in one child was secondary to scarlet fever, in another to small-pox, in a third to erysipelas, and in one was idiopathic. In this respect also laryngeal abscess resembles retropharyngeal abscess, which is probably due to a retropharyngeal lymphadenitis, when not due to disease of the vertebræ. The treatment is obvious, to open the abscess as soon as it can be detected in the neck. In three patients this was done, two recovered and one died.