rapid and continuous act, the blood being projected by the auricles into the cavities of the ventricles, till distension was produced and the systole took place, propelling the blood along the aorta and pulmonary artery.

We have now reached that degree of velocity in the action of the heart when the auricles contract as the ventricles dilate; there being no interval between the diastole of the ventricles and the contraction of the auricles, but the acts occurring simultaneously. And, if we analyse these movements of the heart—that is, when its action is quick—we perceive that the ventricles do not relax before the auricles begin to contract, which can easily be ascertained by placing the point of the finger against the side of the ventricles, and observing the movement of the auricles. The contractile energy of the ventricles may even afford somewhat the appearance of a pause; but, the instant the auricles begin to contract, the fibres of the ventricles relax, the parietes becoming smooth and soft, and the ventricles seem to start up slightly as the blood enters the foramen. Thus some physiologists speak of a pause occurring after the contraction of the ventricles. "When the heart of a living animal is exposed, and the organ is acting in a natural manner, the auricles are observed to become distended with blood, then to contract rapidly and simultaneously, and propel part of it into the ventricles. This is accompanied with a corresponding enlargement of the ventricles, which is immediately followed by their simultaneous contraction, and the propulsion of their blood along the large arteries; then follows a pause, during which the auricles become greatly distended by the blood flowing along the veins." (Article Heart, by Dr. John Reid, *Cyclopædia of Anatomy and Physiology*.) But it cannot be considered a pause; for Dr. Hope has expressly defined the pause as a state of rest and repose to the ventricle, in which the fibres are relaxed, and its cavity partially filled with blood. What Dr. John Reid here refers to as a pause, is the termination of the contraction of the ventricle, or the turning-point, as its fibres relax. The contractile energy of the ventricle ceases as it passes from that state into a state of relaxation; and, when the action of the heart is vigorous, the relaxation of the fibres is merely commencing when the auricles contract and cause the parietes of the ventricles to expand till the diastole is completed. We have even repeatedly seen the auricles contract whilst the ventricle was still in a contracting state; but that moment the fibres relaxed; and, as the blood from the auricles entered the ventricle, the parietes swelled out, and the diastole was completed in its usual manner by a continuous and uninterrupted movement.

When the action of the heart has attained such a degree of celerity that the contraction of the auricles is synchronous with the diastole of the ventricles, the parietes of the ventricles do not instantaneously expand, and then the blood enters the cavities. The movements are simultaneous. The diastole of the ventricles proceeds at a ratio proportionate to the energy with which the auricles contract. If the auricles contract with greater vigour, the ventricles dilate with greater rapidity. If the auricles contract with less vigour, the ventricles dilate with less. And, if we carefully examine the parietes of the ventricles, we can distinctly see and feel that the fibres gradually dilate as the blood from the auricles shoots to the apex and distends the cavity. No doubt the parietes of the ventricles relax after contraction, in virtue of the power which they possess, as muscular tissues, of assuming the previous condition. But the fibres may not always relax with a degree of rapidity sufficient to sustain the vigorous action of the heart. Muscular fibres have been observed "continuing in contraction" (Müller, vol. ii, p. 888); and we have repeatedly seen, when the animal became much agitated, the ventricle remain contracted till excited to dilatation by the blood projected by the auricles; and Müller remarks, "that the degree to which the heart dilates, independent of being dilated by a fluid, can be but slight" (vol. i, p. 233). We have also observed, as already mentioned, the auricles contract whilst the ventricles remained in a contracting state, the animal continuing calm and quiescent; and Laennec, in his observations on the action of the heart, states that, in some cases, the systole of the ventricles seems scarcely over before it begins to swell out afresh (*Dissections of the Chest*, p. 508). The contraction of the auricles, then, being synchronous with the diastole of the ventricles, subserves a most important purpose in maintaining the action of the heart; then a force is exerted which converts the movement of relaxation into one of active dilatation, because the power with which the auricles contract may not only excite the dilatation, but impart a stimulus to the relaxing parietes of the ventricles, which renders the diastole the first and most prominent movement, and the systole its sequence. If we examine the action of the heart under these circumstances, we easily perceive that the movements of the ventricles partake of this character—that the ventricles first dilate, and then contract. For the moment, the auricles contract; the ventricles swell out, as if by an active power, opening up and dilating their walls till, fully distended, they contract, propelling the blood along the aorta and pulmonary artery. Fully to understand this movement, let us suppose a cavity into which a fluid flows as its walls relax or dilate; and,

when filled, the cavity contracts and expels the fluid along another tube. The fluid enters the cavity as its walls expand, and is expelled as they contract, which is the case when the action of the heart is slow. But suppose that a force is exerted when the fluid enters, opening up the dilating walls of the cavity; and, when filled or distended, the cavity contracts, expelling the fluid along another tube. It is evident that the whole character of the movement is changed. There is an active force exerted, both in dilating the cavity and contracting it to expel the fluid; and this is undoubtedly what obtains during the vigorous action of the heart.

That this is the principle on which the action of the heart depends, will more distinctly appear if we attend to the following points. 1. The diastole of the ventricle consists of one continuous movement, by which the fibres are stretched out not merely to their normal extent, but till distension ensues and contraction takes place. 2. The ventricle dilates with various degrees of rapidity, according to the velocity with which the circulation is maintained. It dilates with twice as great velocity at 60 per minute as at 30, and with three times as great velocity at 90 per minute, and so on in relative proportion to the action of the heart. And what is it that confers this power upon the ventricle—first, of attaining, during the act of dilatation, to the point of distension and contraction; and secondly, of increasing the rapidity with which the fibres dilate, according to the increased vigour of the circulation? It cannot depend on mere muscular relaxation, for that would not carry it to the point of contraction; and the increased velocity of the dilatation of the ventricle cannot be accounted for on the principle of the fibres of the ventricle relaxing with greater rapidity according to the previous contraction, because increased action in the dilatation commences before the ventricle contracts. If the action of the heart be proceeding at a moderate rate of speed, and the auricle commence to contract with greater vigour, the ventricle at this moment dilates with greater velocity, and contracts with similar energy. Every successive movement, as the action of the heart increases, proceeds in the same manner, the first impulse of increased activity of the ventricle commencing with, and depending on, the rapidity of the diastole.

(To be concluded.)

SNAKE-POISON AND ITS ANTIDOTE.

By CHARLES J. SMITH,

Inspector-General of Hospitals, Madras Army (retired).

As far back as 1833 or 1834, I published in one of the Calcutta journals a case of snake-poison, and an account of some experiments on dogs that satisfied me that liquor ammoniac, if given in sufficiently large and frequently repeated doses, is a perfect antidote. I was in medical charge of a troop of Horse Artillery at Bangalore, when a snake-charmer was brought to the hospital, who had been bitten, about half an hour previously, on the back of his right hand, by a large cobra. When admitted, he was insensible, and had very much the appearance of a man under the influence of opium. I at once placed a tourniquet on his arm, and thus cut off in some measure the further supply of poison from the wound to the system; applied nitric acid freely to the wound; and bled him in that arm, with the view of removing a portion of the poison remaining in the limb. At the same time I gave, every ten or fifteen minutes, liquor ammoniac in half-drachm doses, diluted with as small a quantity of water as enabled him to swallow it. A cold douche was applied to the head, and a blister to the neck; and, as his pulse was failing, I kept up artificial respiration for some time by the only means at my disposal (blowing into the mouth and nostrils). I had seen artificial respiration successfully tried in a case of poisoning by opium. After about four hours' hard work, the man's life was safe.

Shortly after this, I tried the effect of liquor ammoniac on dogs. Having procured some fresh cobras, I had the dogs held, and the mouth of a snake fairly applied to the bare part inside the thigh. The dog was then left till the poison took effect. When I administered the liquor ammoniac, in every instance, the dog was saved; while those to whom the antidote was not given died.

I consider that liquor ammoniac is a direct antidote, and does not act merely as a stimulant, as it is generally efficacious in cases of poisoning in the dissecting-room.

Some years after the occurrence above narrated, a man, who had been recently bitten, was brought to the Black Town Dispensary. He was evidently under the influence of the poison. Mr. Lawder, the surgeon, was in hospital at the time, and at once applied a tourniquet, and gave liquor ammoniac freely. In three or four hours, the symptoms of poisoning passed away; but, on loosening the tourniquet, they re-

appeared. It was at once re-applied, and the treatment resumed; but it was not till the third day that it was found safe to remove the ligature, which had been previously relaxed, and as often followed by a renewal of the symptoms of poison.

The difficulty in snake-bites has appeared to me that of having them brought sufficiently soon under treatment, or the bite being in a spot that could not be insulated, as the lip, nose, or ear.

Eau de luce (*spiritus ammoniæ succinatus*) was looked upon as a specific when I went out to India, and, I have no doubt, deservedly. Croft's drops, which I am told are a preparation of ammonia, are considered a specific at the Cape of Good Hope.

My experience is, that death from snake-bite is not by any means common. In regard to the snakes themselves, I tried several poisons—prussic acid, opium, and arsenic—without effect. A native told me that tobacco killed a snake. I tried it. The rapidity with which it acts is extraordinary. A pinch of snuff kills a snake. Snakes are rarely, if ever, seen in tobacco-fields.

OBSTETRIC MEMORANDA.

[UNDER this head, we shall, from time to time, as materials come to hand from correspondents, publish records of cases remarkable in themselves, or illustrating points of interest in obstetric practice, therapeutic or manipulative. We shall probably in this way preserve from oblivion the notes of very many useful and instructive occurrences in private practice; for the great obstetric experience is that—for the most part hitherto unwritten—of the great body of general practitioners throughout Great Britain. We will only ask those who may forward cases for record, to relate them with the utmost brevity, and equally to condense any appended remarks.]

HERNIA VAGINÆ.

By JOHN WADES, M.D., Hanley.

ON November 22nd, I was called to attend A. B., aged 24, in her third pregnancy. The messenger stated that she was near her confinement, and was in much pain; that a midwife had seen her, and said that the womb had been down, and that she had put it up, but that it had come down again. As the midwife observed there was something unusual in the case, she had left, and requested that I should be fetched.

My first impression, when my fingers came into contact with the protrusion on the perinæum, was, that I had a case of prolapsus ani to deal with; but, upon introducing my index finger up the rectum, I found that there was no displacement there. I now examined the front passage, and diagnosed the hernia—which was of considerable volume—to be the posterior wall of the vagina; the rectum not being involved. I, without much difficulty, reduced the displacement, and applied a pad with T-bandage upon the same principle as in prolapsus recti. The patient suffered much from fits of spasmodic coughing, which greatly aggravated the mischief. I prescribed a sedative mixture, and enforced upon her the necessity of maintaining the recumbent position.

When I called the following day, she expressed herself as much better. There had been no reprotusion; but, when she coughed or sat up, she felt as if her body would come down again. On these occasions, she pressed her hand upon the pad, which afforded her much support. She had urinated without difficulty. I repeated my previous instructions with regard to keeping the recumbent position, ordered her to continue the mixture as required, to have a light diet, and, if the bowels were not opened by next day, to take a small dose of castor-oil.

Nov. 26. On calling to-day, I found the patient lying on a sofa down stairs. There had been no return of the hernia. Her cough was better, and the bowels had operated easily with oil. I directed her to avoid straining, and to keep the recumbent position as much as possible until her confinement.

Dec. 15th. I was called about 7 A.M. to attend A. B. in labour. I immediately obeyed the summons; but, although it was only a short distance from my house, the child was born before I arrived. I assisted in removing the placenta, and the labour was completed naturally without any fresh prolapse having occurred from the time when I had reduced it.

This woman, in her previous confinements, had very rapid labours, being delivered before the midwife could reach her; and I think that the strong uterine contractions and straining had produced a state of parts predisposing to the vaginal protrusion. The woman herself alleges that the violent fits of coughing were the immediate cause of the prolapse.

REPORTS

OF

MEDICAL AND SURGICAL PRACTICE IN THE HOSPITALS OF GREAT BRITAIN.

MIDDLESEX HOSPITAL.

CANCEROUS TUMOUR OF THE MEDIASTINUM: CANCER OF THE PLEURA, WITH EFFUSION: PARACENTESIS THORACIS: DEATH: WITH CLINICAL REMARKS.

(Under the care of Dr. MURCHISON.)

THE patient, M. A. L., aged 36, a female servant, of steady habits, was admitted on October 15th into the Middlesex Hospital. Her father died of "consumption", at the age of 44; but, with this exception, her family history was unusually good. She herself had enjoyed excellent health until about seven years ago, when it began to fail; and cough, night-sweats, and pain chiefly between the shoulders, came on. Indeed, from this time she appears to have suffered from the cough, increased in severity during winter. No urgent symptoms, however, supervened upon this chronic state of ill-health until two years ago, when she coughed up a tablespoonful of blood, and shortly afterwards was confined to bed for three weeks with "pleurisy in the side"; a second attack occurring in the following year. She was not, however, able to state which side was affected either time. She seems to have remained in her usual state of health until July, when the night-sweats became very profuse, and she began to lose flesh rapidly. The catamenia, which had been always regular, ceased after getting wet; her feet began to swell, and increased so as to prevent her moving about; and in September her symptoms became more and more urgent, and confined her to bed during the last three weeks.

On admission, there was considerable œdema of both legs, of the left arm, and of the left side of the head and neck. She lay for the most part on the left side. She perspired freely. Her dyspnoea was distressing; she had no rigors. The temperature was 98.3; respiration 28. Over the left lung in front and behind, there was complete dullness, with distant and feeble respiration; the vocal thrill and resonance were diminished; the latter was ægophonic at the upper part. No friction or crepitation was heard. She had frequent cough, with frothy mucous expectoration. Over the right lung, the percussion-sound was clear, and respiration puerile. The cardiac impulse was felt at the upper and left part of the epigastrium. The sounds were much louder to the right of the sternum than below the left nipple. Pulse 120. The tongue was moist and slightly furred. She had frequent vomiting in the morning with the cough. The bowels were much relaxed on the day before her admission. The urine was free from albumen. She was ordered to take the following mixture every six hours.

℞ Potassii iodidi gr. iv; spirit. ætheris nitr. 3 ss; decocti scoparii 3iss. M.

Also to take three times a day a pill (known as the "Middlesex Hospital pill") containing gr. ½ of powdered digitalis, gr. 1½ of powdered squill, and grs. 3 of pilula hydrargyri. She was directed to have four ounces of port wine, and simple diet with beef-tea and eggs; and to have the left side painted with tincture of iodine.

Two days afterwards, her breathing had risen from 28 on admission to 48; the dyspnoea had become very great, the breathing over the left lung much fainter, and the œdema increased. A bulging appeared over the left clavicle, soft, non-pulsating, varying in size at different times, and not distinctly pitting on pressure. The measurement of both sides of the chest below the nipples was, on the right side, 15 inches; left, 16½ inches. She was still perspiring greatly. There was no change of importance in her other symptoms. Linseed-meal and mustard poultices had been applied on the previous day to the chest, but with no relief.

Considering the urgent nature of the patient's symptoms and their rapid increase, Dr. Murchison resolved to take more active measures for her relief. Accordingly, paracentesis thoracis was performed with a small trocar between the seventh and eighth ribs; and forty-six ounces of clear straw-coloured fluid, of specific gravity 1012, were drawn off. This was followed by immediate relief to the breathing. She was ordered a subcutaneous injection of a quarter of a grain of morphia in the evening. She slept fairly during the night. In the morning, there was dullness in the lower third of the left lung; but by the afternoon it had extended over the lower two-thirds, and her pulse had increased from 108 to 120; the cough had become very frequent, with tenacious and slightly rusty sputa; and there was tubular breathing in the supraspinous and infra-axillary regions, with some fine crepitation below the left