being 2691 cubic *centimètres*. During the next seven days, he took ten minims of tincture of belladonna thrice daily, and during this time his daily average quantity of urine was 2547 cubic *centimètres*. For the four following days, he took fifteen minims of the tincture of belladonna, and the average daily quantity of urine was 1822 cubic *centimètres*. During the next eight days, his medicine was increased to twenty minims three times a day, and during this time the average daily quantity of urine was 1485 cubic *centimètres*. For the next four days, he took twenty-five minims of the medicine, and passed during this time daily 1350 cubic *centimètres*. During the following six days, he took half a drachm of tincture of belladonna thrice daily, during which time his daily average quantity of urine was 1258 cubic *centimètres*. He left the hospital for ten days, taking no medicine, and was then readmitted for two days, during which time he passed an average of 1190 cubic *centimètres* daily.

The specific gravity remained the same throughout, undergoing no increase with the diminution of water. His appetite improved considerably whilst in the hospital, and he complained less of thirst.

The patient was lost sight of for a time, but, in December 1874, again came under the care of Dr. Ringer as an out-patient. There had been no material change in his condition since leaving the hospital, and he was still suffering from the same group of symptoms. Upon this occasion, the treatment by ergot was adopted. Being an out-patient, it was impossible to make any minute or systematic observations as to the effects of the drug upon the character of the urine or on its constituents. The boy was kept from school, and the urine was measured daily by the mother, a remarkably intelligent woman, accustomed to the work, and fully alive to the necessity for accurate observation. The patient was kept for some days without medicine, and was found to be passing an average daily quantity of 3174 cubic *centimètres*. He was then ordered twenty minims of the liquid extract of ergot, to be taken in half an ounce of water three times a day. During the following week, his daily average was 2493 cubic *centimètres*, which, in the next week, was reduced to 2351 cubic *centimètres*. The ergot was then given in fifteen-minim doses every four hours, with the reduction during the next eight days of the quantity of urine passed to an average of 2069 cubic *centimètres* daily. The ergot was then further increased to half a drachm every four hours, the average daily excretion of the week being 1983 cubic *centimètres*. During the next twelve days, the average had fallen to 1842 cubic *centimètres*, the maximum quantity passed being 2267 cubic *centimètres*, and the minimum 1700 cubic *centimètres*. The patient's appetite being extremely poor, a quassia mixture was substituted for the ergot during the next fortnight, but without any increase in the amount of urine passed. The ergot was then resumed in half-drachm doses every four hours, the daily average of the first four doses being again 1842 cubic *centimètres*, and of the next four 1615 cubic *centimètres*. The medicine was taken continuously during the following month in aggregate daily doses of two drachms, but without any further influence on the urinary secretion, the quantity passed varying from 1700 to 1983 cubic *centimètres* daily. The ergot was then permanently discontinued, and during the following month simple bitters were given, but without any increase of urine.

During this course of treatment, there was a marked improvement in the patient's general condition. The morning vomiting and sickness after taking food entirely ceased. The cramps in the calves of the legs, which had frequently kept him awake at night, were speedily controlled by the medicine, but returned, though with less severity, on its omission. The skin and hair were moister, and the thirst was much less troublesome. The ergot failed to improve the appetite, and had no action on the bowels, which remained obstinately confined. He gained in flesh, and his mother stated that he was "better in himself, more lively, and not so much over the fire". The urine was examined at intervals; but there was but little variation in its specific gravity, which was always about 1.006. The patient's extremities never at any time during the administration of the medicine exhibited any tendency to become gangrenous.

Respecting the ultimate termination of the case, it may be stated that, a few weeks later, an opportunity was afforded the patient of making a short sea-voyage, of which he, by the advice of his friends, availed himself. He suffered greatly from sea-sickness, missed the milk to which he had been so long accustomed, and was unable to take more substantial nourishment.

On several occasions, he bled copiously from the gums, the hæmorrhage, in the absence of proper medical aid, proving extremely obstinate, and rapidly reducing him to a state of complete prostration. He was brought back to London as quickly as possible, where, after lingering a few days, he died. At the time of his death, the patient had just completed his fifteenth year. Nothing is known respecting

the quantity of water passed whilst away from home; but, during the last few days of his life, his mother stated that he passed very little: not more than a pint in the twenty-four hours. No *post mortem* examination was made.

Before inquiring into the mode of action of the drugs administered in this case, it is necessary to consider briefly the pathology of the disease. It has long been recognised that the essential seat of the disorder in diabetes insipidus must be looked for elsewhere than in the kidneys. The diverse organic conditions found in these organs *post mortem* are evidently secondary changes resulting from the abnormal demand upon their functions caused by the long-continued diuresis. It has been stated that the organic change upon which the disease in these cases depends was to be found in the suprarenal capsules, which, upon this theory, were supposed to be endowed with the function of regulating the activity of the renal secretion. This statement has not received general acceptance; several *post mortem* examinations have been made in cases of diabetes insipidus without the detection of any morbid change in the suprarenal capsules; and, on the other hand, the suprarenal capsules have been found extensively diseased in cases in which it was known that the patient had not during life suffered from polyuria. The connection between diabetes insipidus and Addison's disease, supposing it to exist, must be extremely slight. Bernard's experiment of producing an excessive flow of urine by puncturing a certain spot in the floor of the fourth ventricle, has shown that the essential lesion is situated in the nervous system. It is probable that the polyuria is due primarily to dilatation of the renal capillaries. It is now universally admitted that the calibre of the blood-vessels is regulated by vaso-motor nerves derived immediately from the sympathetic, and presided over by cells contained in the medulla oblongata. This general vaso-motor centre exerts a constant influence over these blood-vessels, maintaining them in a state of semicontraction. Division of these nerves is immediately followed by vascular dilatation. It can be shown experimentally that division of the great splanchnic, the largest vaso-motor nerve in the body, causes dilatation of the vessels of the kidney, with hyperæmia of the parenchyma and secretion of an abnormally large quantity of urine. It is probable that diabetes insipidus consists essentially of paralysis of that portion of the sympathetic which is distributed to the renal vessels. The situation of the general vaso-motor centre in the floor of the fourth ventricle and its neighbourhood affords a ready explanation of Bernard's experiment. The influence of blows on the head or stomach acting as exciting causes of the disease is readily explicable upon this theory. That mental excitement will cause an excessive flow of watery urine, which may be regarded as a state of transitory diabetes insipidus, is a matter of every day observation.

This, then, being the essential pathology of the disease, a consideration of the physiological action of belladonna will afford an explanation of its mode of action. Harley has found that, after the administration of a moderate dose of belladonna, the arteries are contracted; but that, when a large dose is given, this contraction is replaced by dilatation. The primary contraction is due to stimulation of the sympathetic system, and the subsequent dilatation to the exhaustion resulting from the previous overstimulation. It is probable that it is in this manner that belladonna exerts its beneficial influence in cases of polyuria by stimulating the paralysed sympathetic and contracting the arterioles. Brown-Sequard maintains that belladonna contracts the arterioles by exerting a powerful influence on the unstriated muscular fibres, although he adduces no proof of the correctness of this statement. Supposing this view to be correct, an explanation is still afforded of the action of the drug in cases of polyuria. On the one theory, it stimulates a paralysed sympathetic; on the other, it acts directly on the muscular fibres of the blood-vessels, and itself becomes, if one may use the expression, an artificial sympathetic. What has been said respecting belladonna is equally applicable to ergot. Our knowledge respecting the physiological action of this drug is small; but it is known to contract the arterioles, whether it act on the sympathetic, or directly on the unstriated muscular tissue.

CONGENITAL LARGE-CELLED ALVEOLAR SARCOMA.

By JOHN STEVENSON, M.B., Edinburgh.

THE following case is remarkable on account of the congenital occurrence of a large sarcomatous tumour of a rare anatomical type, presenting physical characteristics which at first resembled another form of disease.

The patient was a baby aged about fourteen days, when first seen by

me. To all appearance, the child was a healthy one, and pretty well nourished. There was situated on the right side of the neck and face a swelling most prominent behind the angle of the lower jaw, and extending under the chin, but not crossing the middle line. Manipulation of the tumour gave the impression of several hard glandular enlargements corresponding in situation to the right parotid, submaxillary, and sublingual glands. On looking into the cavity of the mouth, the tongue was observed to be pushed up towards the roof of the mouth, and to the opposite side (that is to the left) by a sublingual tumour about the size of a walnut extending behind the frænum, and on its opposite side for about a quarter of an inch. The growth was elastic and movable up and down, but did not feel like a cyst. A small incision over its interior surface caused a little thin clear fluid to be projected from it, and a gelatinous looking body to protrude through the wound. The mother stated that the enlargement on the side of the neck and in the mouth was observed when the child was born, and that, in consequence of the latter, it had been unable to suck, and she had been obliged to feed it with a spoon.

Treatment.—The mother was ordered to rub in a piece of the size of a pea of the following ointment every night.

R. Unguenti iodi, P.B., ʒss; unguenti hydrarg. ʒj; adipis ʒss.

Two grains of potassium iodide were ordered to be taken twice a day.

The case was looked upon as one of myxoma causing mechanical obstruction of the ducts of the salivary glands from external pressure, thus converting the glands for the time into retention-cysts; but against this theory were the facts that the enlargements corresponding in position to the salivary glands of the right side, were rather more resistant on palpation than a retention-cyst of such origin; that although the ductus Stenonis was not pressed upon by the sublingual tumour, the enlargement in the situation of the parotid gland was as large as those in the situations of the other salivary glands. Enucleation was supposed to be out of the question in consequence of the tender age of the child. A seton was passed through the growth in the mouth, and pulled backwards and forwards daily. After the treatment had been continued for four days, the swelling on the side of the neck was observed to be perceptibly smaller, but that inside the mouth was perhaps a little larger, as it seemed to extend further to the opposite side of the frænum linguae. The mother was told to continue the ointment; and three-grain doses of iodide of potassium were prescribed. It was thought advisable to take out the seton, as the waste caused by suppuration seemed to be small in proportion to the rapidity of growth, which it was supposed the irritant action of the seton on the tissue might tend to increase.

The child died at the age of three weeks, when permission to examine the tumour was asked and given, and the following additional history elicited. When Mrs. S., the mother, was four or five months gone in pregnancy, she went to the Sunderland Infirmary to visit a cousin of her husband, who was reported to be dangerously ill with tumour in the womb. Mrs. S. says she got a fright, and felt very much put about. She also states she has had twelve children besides this one; the longest lived died at the age of eighteen months (cause unknown). The remaining ones were either premature, or only survived a week or two. This child seemed to die of asphyxia, as it took food greedily, and could swallow till the last.

Necropsy, seven hours after death. The body was spare, but not markedly emaciated. Rigor mortis was well pronounced, but there was no great *post mortem* lividity. On the right side of the neck, extending from behind and in front of the ear, along the lower margin of the lower jaw beyond the middle line for a short distance, was a large rounded tumour, over which the skin appeared natural. Its vertical sectional outline would be what, in the language of modern pathology, is distinguished as a tuber. It was elastic, and softest where it approached the middle line of the neck, and about the size of a small fetal skull at the full time. It was distinctly lobulated and movable to a small extent. In the mouth under the tongue, the tumour could be seen pushing that organ upwards and backwards, and to the opposite side. The little finger passed over the dorsum, could not reach the epiglottis on account of its size. It projected beyond the frænum on the left side. Passing down behind the body of the lower jaw, it formed a marked prominence in the intramaxillary region, which could be felt to move down when pressure was made inside the mouth. The morbid growth could be traced along the lateral aspect of the tongue to its root. A T-shaped incision was made over it, and the skin and superficial fascia dissected up. On exposure, the substance of the growth appeared soft and somewhat translucent or grayish white, apparently enclosed in a thin fibrous capsule, and easily separable from the superjacent fatty tissue. Its deep relations were not defined, as the parents requested that no more should be done to the

body than was necessary to determine the nature of the disease. When the growth was cut into, it was found to have undergone cystic degeneration in its central parts to a considerable extent, leaving as the products of retrogressive change several cysts, differing in size from one another. Some contained caseous matter resembling pus; some bloody and amber-coloured serum; and one was filled with what resembled blood; one or two cysts were as large as a walnut. The caseous matter was mostly found in the smaller cysts, and, in the smallest, resembled in consistence soft cheese.

Microscopical Examination.—The tumour was hardened and several sections made, some of which were stained with carminate of ammonia and examined. Minute shreds were also teased with fine needles. It was ascertained that the structural elements were combined in the way described by Rindfleisch (*Pathological Histology*) as characteristic of large-celled alveolar sarcoma. The cells were of two sizes: the smaller, spindle-shaped and very like the cells of spindle-celled sarcoma, formed a network, in the meshes of which were contained groups of larger round or nearly round cells, with large prominent nuclei, which readily took on the carmine stain; with the cellular elements ran very fine filaments or fibres of imperfectly developed connective tissue, to which the cells were very strongly adherent. Many of the cysts contained true pus-elements, others appeared to have resulted from colloid metamorphosis.

Can this have been a case of sarcomatous diathesis; that is, one where there was a tendency of the connective tissue series to the development of sarcomatous new formation? and was this latent tendency roused into activity during intra-uterine life by a maternal impression?

CLINICAL MEMORANDA.

CAUSES OF DEATH UNDER CHLOROFORM.

In some "Remarks on one of the Causes of Death during the Extraction of Teeth under Chloroform", published in the JOURNAL of December 4th, Dr. Lauder Brunton states his opinion that a certain number of the deaths occurring during the inhalation of chloroform are the result of shock, and might have been prevented by a more liberal administration of the anæsthetic; and, having given the physiological explanation of the reflex arrest of the heart's action, Dr. Brunton recommends that chloroform should be given "with a free hand", for the better exclusion of this danger. That is to say, death is more likely to result from giving too little than too much chloroform. This seems to me to be dangerous doctrine; for, although, doubtless, some of the deaths attributed to chloroform may really have been the result of shock, yet even in these the free administration of chloroform would, I believe, rather have increased than lessened the danger.

The chief danger of chloroform has been proved to be a sudden paralysis of the heart, and this danger increases in proportion to the concentration of the vapour. Moreover, I can state, from a large experience in the administration of chloroform, that persons deeply under its influence show very decided symptoms of the shock of an operation; and I have noticed almost invariably that the effect of any severe surgical operation has been to rapidly and markedly depress the heart's action.

A large number of the deaths from chloroform (twenty-four out of Snow's fifty cases) have taken place before the commencement of the operation, and these have almost all occurred from a sudden arrest of the heart's action. This arrest could not, in these cases, have been of the reflex character described by Dr. Brunton; and even the cases which he quotes do not seem to me to bear the interpretation which he gives them.

In the first case quoted by Dr. Brunton, no chloroform was given, so that it can hardly be said to have any bearing upon the question of the mode of death under chloroform. Nothing is said of the condition of the heart, and I do not know if any *post mortem* examination of the patient was made; but, if there were (as seems probable) a feeble and easily paralysed heart, the case might still have furnished death from chloroform had the anæsthetic been administered.

In Dr. Brunton's second case, the man became very suddenly insensible after a stage of excitement, and, though death occurred after the administration of chloroform had been discontinued, the vapour was still being absorbed into the blood, and the mode of death resembled that of other cases wherein no operation had been performed. The published account of this case is rather confused, and the chloroform was administered by an unqualified person—"a sort of surgery man".

In the third case, although at first the administration of the chloroform by the ordinary machine did not make the patient insensible, yet, when it was given more freely on a napkin, he was soon under its in-