called it interstitial. It is only, however, a modification of the parietal. In the first and last varieties the point of connexion may be more or less constricted and lengthened out, constituting a pedicle. In this case the tumours are called *pedunculated*; and, when the tumour is within the cavity of the organ, by common consent the name of *polypus* has been applied to it.

The size to which some fibrous tumours will grow is enormous. Commonly they weigh from 3 to 4 lbs., frequently 7 to 8 lbs. Krüll met one which weighed 36 lbs. Gaultier de Claubry one which weighed 39 lbs. Kraumer met a surface pediculated tumour 46 inches in circumference, and which weighed 40 lbs. Dr. Graily Hewitt met with one which weighed 42 lbs. Waller mentions one which weighed 74 lbs. The largest tumours, however, are the pedunculated.

Extrauterine fibrous tumours sometimes have very small and weak pedicles, and these occasionally give way. Then they either continue to float within the cavity of the abdomen, and are there nourished in a very analogous manner to the loose bodies in articulations. Sometimes, however, they become again attached to some portion in the vicinity of the uterus, bony or otherwise, and constitute the "*tumeurs pelviennes*" of Huguier, or the "*tumeurs fibreuses de la fosse iliaque*" of Nélaton, not usually noticed in classical works. A very full account of these is given by Huguier and Nélaton (*Gaz. des Hôpitaux*, 1860, 411, and 1862, 77). The former was the first to call attention to them in 1860. They may be *intrapelvic* or *extrapelvic*. They are generally situated between the fascia transversalis and the peritoneum. Huguier's first case was attached to the sacro-iliac synchondrosis; two others were attached to the left anterior superior spinous process; another to the fourth false rib and left crista ilii. A similar one was seen by Verneuil also attached to the left anterior superior spinous process. The two cases described by Nélaton were in the right iliac fossa, one attached to the crista. These tumours are never found in men, a fact which shows their origin from the uterus; and, curiously enough, they have always been found in women who have borne children. Their size varies from that of a nut to that of an apple; and of this size they have been met in the posterior cul-de-sac by Depaul, so as to interfere with labour. In their structure they exactly resemble the uterine fibrous tumour; another reason, as Barth emphatically asserts, which proves that they originate from the uterus (*Bull. de la Soc. Anat.*, vol. xix, 13). In one case recorded by Gosselin, and in another by Chassaignac, they were recurrent. In Chassaignac's case, where the *écraseur* was used, followed by the red-hot iron, the tumour recurred in fifteen days. A second operation, followed by the Vienna paste, proved more successful. These tumours are hard, not adherent to the external skin, with a certain degree of mobility, limited only by the pedicle, smooth on their surface. They are often the seat of pain locally, of a lancinating character, like the points of needles. This pain is often aggravated by pressure. The only point of difference in the feeling between these tumours and the so-called displaced ovaries is that, although pain is produced by their pressure, it is not attended with sickness, as in displaced ovary. Their growth is usually very slow, occupying years in development. There is a very in-

teresting case recorded by M. Demarquay (*Bull. de la Soc. Anat.*, xix, 13) of a pelvic fibroid which weighed upwards of eight pounds, surrounded by gross veins and made up of lobes. It was situated in the left iliac fossa, and partly ossified; another character common both to these bodies and to sub-peritoneal fibrous tumours of the uterus. No pedicle could be found. Barth, however, asserts that these pedicles are sometimes very minute, and may easily escape observation.

[To be continued.]

Original Communications.

PATHOLOGY OF BLOOD AND FEVER.*

By WILLIAM ADDISON, M.D., F.R.S.

Blood consists of two distinct parts: the corpuscles, and a fluid—the liquor sanguinis. During respiration blood absorbs a small portion of oxygen, and, at the same time, gives off carbon in the form of carbonic acid.

The amount of carbon expired from the lungs may be altered by many circumstances. Hunger and rest diminish, satiety and labour increase it. It is greater during the day than at night, and greater in children than in adults.

That the carbon expired from the lungs is discharged from the corpuscles of blood seems proved, by the change of colour they undergo in the lungs, and because in healthy persons the consumption of oxygen and the amount of carbonic acid expired are in a direct ratio with the number of corpuscles in the blood of the person.

Urine is a fluid withdrawn from the liquor sanguinis. It holds in solution a peculiar matter called urea. And it is to be observed amongst all classes of animals which have red corpuscles in their blood, that urea and uric acid, or one of the two, is a constant constituent of the secretion of the kidneys. But whence is urea derived?

The kidneys of an animal have been extirpated. In such cases, where the animal has survived the operation, a large amount of urea has been found in the liquor sanguinis. It is very clear, then, that urea is not formed in the kidneys. On the other hand, the chemical analyses of blood and urine by Andral and Gavarret, by Becquerel and Herberger, would seem to leave no doubt that urea is an excretory product of the blood-corpuscles. Herberger analysed the urine of a chlorotic girl on three occasions before, and twice after the use of iron. The amounts of urea before the use of iron are represented by the numbers 7.04, 7.00, and 7.12. After the use of iron these numbers rose to 26.8 and 27.3. In connection with these analyses of the urine, small quantities of blood have been taken from chlorotic girls and analysed before and after the exhibition of iron. In one case, previously to the use of iron, the amount of blood-corpuscles in a thousand parts of blood is represented by the number 46.0. After the use of iron for some weeks, this number rose to 64.0. In another example, the number before the use of iron was 49.0, after it, this number rose to 95.0.

The amount of urea in the urine increases, *pari passu*, with an increase in the number of corpuscles in the blood; and the presumption is, that the use of iron as a remedy for chlorosis would not have increased the amount of urea in the urine, had there been no increase in the number of corpuscles in the blood.

* A Abstract of two lectures delivered at Brighton, November 1863.

The corpuscles of blood contain a fluid. And the only explanation which can be given of it is, that they take in fluid from the liquor sanguinis. And if a fluid be absorbed by the corpuscles from the liquor sanguinis, some kind of used material must be discharged from them, otherwise they would gradually increase in size, which we know is not the case. Of what nature, then, is the used material discharged from blood-corpuscles into the liquor sanguinis? Our answer is, from the analyses just mentioned, that it is represented by urea or uric acid. It would appear then, that the vital properties of the corpuscles of blood are sustained, on the one hand, by fresh material (oxygen) derived from the atmosphere, and on the other hand, by fresh material (a fluid) from the liquor sanguinis; and that used material (carbon) is discharged from them into the atmosphere, and used material (urea) into the liquor sanguinis.

This account of the actions of blood-corpuscles corresponds with what has been observed in all other departments of life. Every living body, whether plant or animal, is at all times taking in fresh material from surrounding matter; it is also at all times discharging or throwing off used materials. And used materials accumulating in contact with living elements, are prejudicial to health and vigour. We need not dwell upon examples. But if the statement be true of living bodies, it must be true of the various cells of the body. And we conclude it to be true of the corpuscles of blood, which are cellular bodies.

The first inquiry then is, as to the phenomena which appear in the human body from accumulation of used material in the blood.

Pathology of Retention of Carbon. In acute pneumonia, the interchange between the corpuscles of blood and elements of the atmosphere are hindered sometimes over a large area of the lungs. In such cases the countenance, lips, and skin of the patient are dusky or dark coloured. These appearances announce disturbance of the corpuscles of blood as distinguished from the liquor sanguinis, which is colourless.

The other symptoms of severe pneumonia are fever, wandering of the mind, delirium, and coma; because impeded respiration hinders the discharge of carbon from the blood corpuscles, and the brain suffers as from a narcotic poison. In drowning, the discharge of carbon is totally arrested, and a speedy loss of consciousness ensues. When respiration is restored, carbon is again discharged from the blood-corpuscles, and consciousness returns. Ether and chloroform are hydrocarbons. The inhalation of the vapour of either of them produces insensibility; because the inhalation of vapours already saturated with carbon, stops the discharge of carbon from the blood. These pathological phenomena are proofs of a very close relation between the corpuscles of blood and elements of the brain. Is there anything in the anatomy of the organ which helps to explain it? The brain is very largely supplied with blood; nevertheless it is an extremely soft or diffuent organ. It falls to pieces upon the slightest handling. This condition of the organ would seem to imply a species of actual contact between corpuscles of blood and elements of brain; because the coats of the extreme vessels have no coherency.

Pathology of Urea. When the kidneys are diseased, urea accumulates in the liquor sanguinis. Suppression of urine from any cause leads to accumulation of urea in the liquor sanguinis. In these cases the symptoms are those of brain-disturbance, tremblings, muttering, delirium, and coma. Sir H. Hallford has left a record of five examples of suppression of urine, and in all of them the symptoms before death were those of poisoning of the brain and nervous system

from accumulation of urea in the blood. Thus we show that the used materials of the corpuscles of blood are poisonous to the brain and nervous system, if not eliminated and discharged away from the body. That is to say, the corpuscles of blood in the exercise of their natural functions give origin to poisons, which are eliminated by the lungs and kidneys.

Liquor Sanguinis. In man, and in all the higher animals, under the most opposite kinds of food, the corpuscles of blood, although somewhat different in form, are of the same red colour, and are similar, if not identical, in chemical composition. The liquor sanguinis, on the other hand, is variable in its composition.

It is well known that numbers of people enjoy health and pursue their daily avocations upon very different systems of diet. Moreover, the diet of both rich and poor varies with the seasons of the year in respect of fruit and vegetables. That elements of diet mingle with the blood is proved, because numerous substances taken as food or drink have been detected in blood. When iron has been taken as a remedy for chlorosis, it has been discovered in the urine by its appropriate tests. If a few drops of spirit of turpentine be taken into the stomach, a very short time elapses before the odour of it may be perceived in the urine; and urine is a fluid withdrawn from the liquor sanguinis. But the corpuscles of blood have a uniform composition, that is to say, a composition which does not vary with everything in the liquor sanguinis. It must, therefore, be the fluid of blood which conveys things of diet from the stomach and alimentary canal to the kidneys.

All secreting organs derive elements of secretion from the blood. The milk of a nurse will acquire purgative qualities from her having taken aperient medicine. Mercury and sulphur taken into the stomach have been found in the cutaneous secretions. Other medicines taken into the stomach have been discovered in the blood, and after death in organs of secretion and in the brain. In these examples—if the corpuscles of blood have a uniform composition—the liquor sanguinis must have been the medium of transmission.

But a substance in solution in the liquor sanguinis must be distributed generally throughout the whole body. How is it, then, that symptoms of poisoning are local? When a person takes small quantities of mercury repeatedly, symptoms of poisoning appear in the salivary glands. Narcotic poisons taken into the stomach produce disturbance in the functions of the brain exclusively. Moreover, the brain is unaffected when the salivary glands are suffering severely from mercury; on the other hand, the salivary glands are unaffected by a narcotic poison.

Physiologists explain these phenomena by reference to the specific properties of different kinds of cells. All cells, they say, manifest a property of absorption. But they do not admit indiscriminately every sort of surrounding matter; on the contrary, they exhibit peculiar affinities. And it is in virtue of these affinities in cell-elements that secreting organs manifest special relations towards particular poisons.

That this is a true interpretation seems proved, not only by the limited effects of poisons, but because all the organs of the body are indifferent to many substances in the liquor sanguinis which, *a priori*, we should have expected would seriously disturb or poison some of them. For example: ferrocyanide of potassium may be taken into the stomach to a considerable amount, and be very soon detected in the urine. To reach the urine, it must have been in solution in the liquor sanguinis. If in solution in the liquor sanguinis, it must have circulated through all the organs of the body. Nevertheless, no signs of distress or dis-

turbance appear in any organ from its presence in the blood. Ferrocyanide of potassium is not a necessary of life. Nor can it be said to be a poison. We say it is a thing indifferent.

It may be affirmed, then, respecting soluble matters in the liquor sanguinis, that—1. Some are necessary to life; 2. Some are indifferent; And, 3. some are medicines or poisons.

1. Those things are necessities which preserve the mean physiological constitution of the liquor sanguinis in respect of water, fibrine, albumen, fatty compounds, and salts. They are comprehended under the terms diet, food, and drink.

2. Those things may be said to be indifferent which are not necessities, but which, being present in the liquor sanguinis, pass away through some depurating organ without any sensible effect upon the health or feelings of the person; as ferrocyanide of potassium, and other things.

3. Those things are medicines or poisons which sensibly vary or disturb the functions of some local organ; as opium, mercury, etc.

Hence, then, the category or class in which a substance in solution in the liquor sanguinis is placed, is determined by its properties in relation to some tribe or group of cells. The mere fact of a thing being in the liquor sanguinis amounts to nothing, if it do not affect any of the cell-elements of the body.

Now the corpuscles of blood constitute a tribe or group of cellular bodies. We have, therefore, strong ground for arguing that they have those properties which are common to all cells, namely, special affinities.

In explanation of phenomena in inorganic bodies, the chemical philosopher is constrained to admit a doctrine of elective affinities. And the physiologist, in explanation of the various products of the living body, feels in like manner constrained to admit a similar doctrine with respect to the actions of cells. But a doctrine of special affinity, whether applied to the molecules of ordinary matter, or to the cell-elements of living bodies, necessarily implies a co-ordinate indifference or resistance. That is to say, if cells have special affinities towards some things, we must admit indifference or resistance towards other things. For example, if a plant resist the vicissitudes of heat and cold, no difficulty is felt in referring the power of resistance to the plant. But the resisting power is different in different parts of the individual. The blossom droops before the leaves, the leaves before the stem. This can be referred only to different susceptibilities in different sorts of cells; and a difference of susceptibility is a difference of resistance.

Applying this doctrine of resistance to the relations subsisting between the corpuscles of blood and the liquor sanguinis, the argument is, that poisons calculated to disorder some local organ may be in solution in the liquor sanguinis without disturbing the corpuscles of blood.

It is very usual to say that narcotic poisons are specific to the brain; mercury specific to the salivary glands; other poisons specific to other organs; and our object is to show that there are poisons specific to the corpuscles of blood.

In all the severe or malignant forms of fever, blood is of a darker colour than natural. Huxham, Fordyce, Perry, Armstrong, Rokitsansky, Simon, and most other writers on fever, speak of the dark hue of the blood in the malignant forms of the disorder. And with the deepening hue of the blood, cerebral disturbances deepen also. That the dark hue of the blood in fever is evidence of some change or incapacity in the corpuscles seems proved, because exposure to air has no effect in brightening it.

[To be continued.]

DIFFICULT LABOUR FROM DEFORMED PELVIS, REQUIRING CRANIOTOMY: UTILITY OF DR. EARLE'S PELVIMETER.

By A. MEADOWS, M.D., M.R.C.P., Physician-Accoucheur to the General Lying-in Hospital, and to the St. George's and St. James's Dispensary.

IN the third volume of the *Transactions of the Obstetrical Society of London* (page 145) will be found a drawing and description of a pelvimeter invented by Dr. Earle of Birmingham, of which I ventured to express a very favourable opinion in presenting it to the notice of the Fellows of that Society. At that time I had not had an opportunity of testing its value, but such an occasion has since occurred to me, and the results were so completely satisfactory that I am anxious the profession should know of the existence of this very useful little instrument. The details of the case in question are as follows.

On December 23rd, 1862, I was sent for to Mrs. J., aged 31, who, I was informed, had been twenty-eight hours in labour with her first child, little or no progress having been made towards delivery for the last four hours, although the os was reported to be fully dilated. The patient was also beginning to show symptoms of exhaustion. On examination, I found evidence, in the bowed extremities, of rickets in early life; and this prepared me for corresponding deformity of the pelvis, in which I was not disappointed. The promontory of the sacrum was projected forwards, and was approximated by the symphysis pubis. Examination by the finger alone gave me the impression that the conjugate diameter did not exceed $2\frac{1}{2}$, or at most $2\frac{3}{4}$ inches. Having Dr. Earle's pelvimeter* with me, I applied it, and found that it registered a conjugate diameter of $2\frac{5}{8}$ inches; and I may here add, that its employment gave not the slightest difficulty, indeed it was easier to reach the sacral promontory with it than with the finger. In addition to this complication, though the head presented and was resting upon the brim unable to enter the cavity, about six inches of the cord were hanging in the vagina, the pulsation in it being exceedingly feeble. As the patient's condition was such as required speedy delivery, I at once performed craniotomy, and in about quarter of an hour delivery was accomplished.

The patient went on well till the third day, when acute mania set in, and she died seven days after delivery.

A *post mortem* examination was made next day, and there was found commencing inflammation of the peritoneum. The liver and kidneys were large, pale, and fatty; the spleen, stomach, and intestines were healthy. Firm old adhesions of the pericardium existed, together with fatty degeneration of the muscular fibre of the heart, and warty growths on the mitral valve; there was also thickening of the bases of the semilunar valves. The pelvis, after removal of the soft parts, measured at the brim $2\frac{3}{4}$ inches in the antero-posterior diameter, $4\frac{1}{2}$ in the transverse, and $4\frac{1}{2}$ in the oblique.

Thus, it will be seen, that the pelvimeter gave indications which were perfectly trustworthy; and though pretty nearly the same results were anticipated from digital examination alone, it was nevertheless highly satisfactory to have this opinion confirmed as it were by another authority. I can quite imagine circumstances where the employment of this instrument would not only be easier, but the infor-

* This instrument is made by Matthews, Portugal Street.