may have hypertrophy of the uterus accompanying a fibrous tumour of the uterus, which gives way. Sir C. Clarke, Dr. Rigby, Dr. Ashwell, and others, have mentioned cases where this absorption had taken place, though in some cases there was probably death of the tumour, which preceded its removal.

But I have met with at least two distinct cases of large fibroid, which, I should say, filled the pelvis, and materially interfered with the functions in that cavity, where the tumours have gradually diminished to the size of small apples. One of these women was a matron in a charitable institution, and was obliged to give up her place, being incapacitated for work by the size of the fibroid, and its interference with the due performance of her functions, and by general discomfort. Two years subsequently, the tumour had diminished to the size of an apple; and she was enabled to become the active matron to a workhouse —no sinecure—which serves to demonstrates the recovery. In both these cases, however, this absorption was synchronous with the climacteric change. This fact is not new. It has been observed by several authors, English and French; and, so far, my cases are only corroborative. In no case have I ever seen a distinct fibroid, during the permanence and activity of the uterine periodic discharge, become absorbed without active surgical or medical measures.

[*To be continued.*]

AVERAGE ANNUAL PROPORTION OF DEATHS. A return shows the average annual proportion of deaths from "specified causes at specified ages," in England and Wales, during the decennial period 1851-60. In the first named year the population was 17,927,609; in the latter, 20,066,224. The deaths at all ages per 100,000 living, of each class referred to, are given as follows: All classes, 2,217; fever, 91; diarrhœa, dysentery, and cholera, 108; scarlatina, 88; and diphtheria, 11.

THE BIRTH OF A PRINCE. The birth of an heir to the British Crown has given rise to the usual amount of congratulation in courtly phrases in the English papers. The extremely commonplace circumstances, however, attending the birth, have not failed to call out a certain degree of vulgar comment. The Prince of Wales and his wife were engaged on the day of her confinement in skating. Her accouchement was not anticipated until two or three months. She had felt some pain in the morning, but it was not ascribed to the true cause. Towards evening the symptoms became unmistakable. There was no preparation for the coming event; the accoucheur was in London; and there were no attendants worthy of the occasion. Dr. Brown, a country practitioner, had the honour of officiating at the birth. The physician-accoucheur, Dr. Farre, arrived from London just too late. The child was wrapped in cotton in the absence of all baby clothing, and from a neighbouring infirmary plain Mrs. Connor was selected to wet-nurse the infant. The medical attendants issued a bulletin announcing the happy delivery by the Princess of a Prince. Thus ended a scene in high life, not at all unlike that which often occurs in the humblest cottage. The *Saturday Review*, in a very sarcastic vein, ridicules the court customs on such occasions, and takes the medical attendants to task for announcing the birth of a Prince, as though a Prince could be born, and states that it was their duty to declare simply whether the child was a boy or a girl. (*Amer. Med. Times.*)

Original Communications.

PATHOLOGY OF BLOOD AND FEVER.*

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

[*Concluded from page* 204.]

Fever. When scarlet-fever is mild—pursuing its normal course—the lips of the patient and spots of eruption are of a florid scarlet hue. But if fever be severe, these parts assume a dusky aspect. And with the darkening hue of the blood, as we have said, cerebral disturbances deepen also. But what are the relations of the fever-poison to the blood-corpuscles? The presumption is that, when the blood is of a florid scarlet, the corpuscles are reacting energetically, expelling the fever-poison; on the contrary, when the hue of the blood is deepening, we say, that the reactions of the blood are languid and diminishing.

In fever, with a greater number of respirations in a given time, the amount of carbon discharged by the lungs has been found below the healthy standard. And: "from my analyses," says Simon, "a decided decrease of urea below the physiological mean is a characteristic peculiarity of the urine in continued fever." In fever, then, the natural excretions of blood are diminished. But a new poison—some form of contagious poison—appears.

The argument is that, the dark hue of the blood, and diminution of the natural excretions (carbon and urea), and the appearance of a new contagious poison, are evidence of disease of the corpuscles of blood, as distinguished from the liquor sanguinis.

In referring phenomena of fever to the blood-corpuscles, it is not difficult to perceive the relation of these cellular bodies to aëriform poisons. The atmosphere is always charged with terrestrial exhalations, which vary with climate, with the season of the year, and with the day and night. A special reciprocal action takes place in the lungs between corpuscles of blood and elements of air, and it is notorious that aëriform miasms give rise to fevers.

On the other hand, local disorders, disorders of diet (gout, scorbutic ulcerations, boils, eruptions, etc.) may be very strongly contrasted with phenomena of fever. The reason is, because the pathology of the liquor sanguinis is different from that of the corpuscles of blood. We have shown that poisons in the liquor sanguinis have a local action. But disorder of the corpuscles of blood is manifested by those general symptoms of distress comprehended under the term fever; because of the great sympathy between corpuscles of blood and elements of the nervous system as shown in drowning, inhalation of chloroform, etc.

It may be objected to this doctrine, which bases the reproduction of contagious poisons upon disease of the blood-corpuscles, and local disorders without fever upon deterioration of the liquor sanguinis, that it must be impossible to discriminate an illness arising from impurity of the liquor sanguinis, from illness occasioned by disorder of the corpuscles of blood; because these two elements are so intimately mingled together, that disorder of the one must be immediately communicated to the other. But this objection has been anticipated by the facts already related, and which are observable by every one; viz: that poisons in the liquor sanguinis act locally; that the brain remains unaffected by a poison in the liquor sanguinis which is severely disturbing some other organ; and, we have said, physiologists explain these facts by re-

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

ference to the affinities and resistance of different species of cells.

It may seem a pure assumption to extend to the corpuscles of blood a property of affinity and resistance, but the assumption is corroborated by observation. When blood is examined with a microscope, the corpuscles are seen uniform in size and outline. There are, however, many fluids which, when added to blood, change the outline and appearance of the corpuscles. But they are not all changed in the same degree. Some are greatly, others only a little altered; and others again are not at all affected, notwithstanding an intimate mixture of the blood with the extraneous liquid.

In the same person, blood-corpuscles vary in their resisting power; and, *à fortiori*, we may conclude that the corpuscles of blood in different persons vary in the same respects. Correspondingly, it is well known a number of persons may breathe at the same time a miasmatic atmosphere, and yet only some of them may take the epidemic fever; and of those attacked with fever some have a light, others a severe form of it. Here, we argue, the resistance of the individual is typical of the resistance of the blood-corpuscles.

With reference to disordered sensations in fever, we have already spoken of the intimate sympathy between blood-corpuscles and elements of the brain. The painful feeling of thirst experienced by persons in health when deprived of water is typical of the want of fluid for the blood. The distress occasioned by the least interruption to respiration is typical of the urgent need of the blood-corpuscles for air.

So likewise the rigors, alternate heats and chills, restlessness, headache, and want of sleep, which mark the onset of fever, are typical of commencing disorder in the corpuscles of blood. Moreover, we explain the differences between alcoholic intoxication and the delirium of fever, by distinguishing between the two elements of blood. An alcoholic poison in the liquor sanguinis produces a species of delirium and coma; but this passes off in a few hours without fever: whereas the delirium of fever has a period of duration coincident with the generation and expulsion of a morbid poison, formed in the blood of the fever patient by some cellular action.

We are not aware that any philosopher has assigned a reason why the used materials of blood (carbon and urea) are split up into two divisions. Nevertheless it is quite certain that they are so.

Carbon passes away at once from blood-corpuscles into the air in an invisible state.

Urea or uric acid requires a special secreting organ, the kidney, for its discharge from the liquor sanguinis. And we have already alluded to the pathology of retention of these used materials in the blood.

The same kind of division takes place in contagious poisons. For, the breath of the fever-patient exhales an aëriform contagious poison; but the grosser elements of the poison demand some secreting agency for their discharge from the liquor sanguinis. Such are the pustules of small-pox, the poisonous epidermis of scarlet-fever, and other critical secretions from the skin, kidneys, or bowels in other fevers. And if none of the secreting organs be able to cope with the grosser parts of the poison—to eliminate them from the liquor sanguinis—then it is we witness the extraordinary resources of Nature in fever.

An unusual action is established somewhere in the neutral areolar tissue. This is generally a form of inflammation and abscess. An abscess is a species of cellular growth. Pus consists of cells. And the presumption is, that the cells multiply by eliminating morbid elements from the liquor sanguinis—discharging those grosser parts of contagious poisons, which, according to our interpretation of phenomena of fever, have been previously discharged from diseased blood-corpuscles as morbid forms of used materials. This is the doctrine of *cell therapeutics*.

It would appear, then, that the contagious poisons of fever behave as do the natural exuviæ of blood, inasmuch as they are partly eliminated by the lungs, and partly by cellular action in some natural or preternatural depurating organ; a critical abscess in fever being regarded as a preternatural or temporary depurating organ. The facts are, that the natural exuviæ of blood-corpuscles are diminished in severe forms of fever, and a new contagious poison appears. But how do we connect the reproduction of a contagious poison with the blood-corpuscles? To argue this point, let us take the example of small-pox fever.

A quantity of matter from one of the pustules of small-pox, so small that it may be borne on the point of a pin, is sufficient, if introduced into the blood of a healthy person, to induce small-pox fever. The question is not as to the diffusion of the virus used; it is the augmentation of it a million-fold in the body of the inoculated person which is to be accounted for. It may be said that the virus is generated in the pustules; but we regard the pustules of small-pox as holding the same relation to the fever-poison as the kidneys do to urea; because the person inoculated has symptoms of fever, therefore some disorder of the blood, before the pustules contain any virus. And when the pustules are at their height, the fever-symptoms are passing away. Moreover, it is admitted, the seat of all contagious fevers is in the blood. The pustules, therefore, must be dismissed from an inquiry which has to deal with elements of blood.

All secretions are products of cellular action. The virus of small-pox is a secretion. The corpuscles of blood are cellular bodies. And the primary action of fever is in the blood. We dismiss then, the liquor sanguinis, because the question in discussion has reference to some cellular agency. And there remain for examination the colourless and the red corpuscles of blood.

White cells exist in blood, but they are normally too few in number to account for the very large reproduction of the small-pox virus. And in certain states of disease where the number of white blood-cells is enormously increased, the symptoms are not those of fever, nor is any contagious poison generated. On the other hand, red corpuscles exist in blood at all times in countless myriads; and these, in the performance of their natural actions, liberate poisonous compounds which are discharged from the body as carbonic acid and urea, or uric acid.

Such are the facts and considerations which lead to the conclusion that a contagious poison generated in fever is, as it were, the substitute or representative of the natural poisons which are diminished in fever. If this conclusion be established, it follows that phenomena of fever arise from *disorder of the corpuscles of blood*.

If we review the literature of fever, it will be found that varieties of it are discriminated in various ways: some by the circumstances attending their real or supposed origin, as *marsh-*, *jail-*, *camp-*, and *hospital-fever*: some by the characters of the crisis-action, as *small-pox*, *scarlet-fever*, and *measles*.

Some fevers derive their designation from unusual symptoms or appearances, such as *petechial*, *spotted*, and *yellow* fever. Other fevers, again, have been named from some hypothesis respecting their origin or nature, as *cholera*, *typhus*, and *typhoid fever*. Moreover, we read of *traumatic*, *erysipelatous*, *pyœmial*, *phlebitic*, and *puerperal* fever.

It is not difficult to perceive under these various designations two distinct classes of fever. And these are the distinctions to be made between them.

When a person in health takes fever from a miasm in the air, the poison is exterior to the person; phenomena of fever constitute the first departure from health, and local disturbances are consequent on the fever. On the other hand, when fever supervenes or is a consequent of some antecedent local disease or anatomical lesion, the poison which disturbs the blood is concocted in the body of the patient himself, at the place of the local lesion; and the patient, before fever appears, is out of health, because of the local lesion which precedes and occasions symptoms of fever. Moreover, a person already afflicted with some local anatomical lesion which is the cause of fever, is in a more adverse condition as regards recovery than a person in health taking fever from an exterior poison.

Hence, then, the exanthemata and the continued fever of these latitudes are idiopathic or primary fevers —because derived from an exterior poison; whereas traumatic, pyæmial, phlebitic, puerperal, and other forms of typhoid fever consequent on a prior anatomical lesion, are secondary fevers. Such is the basis upon which we enter on the prognosis and treatment of varieties of fever.

Transactions of Branches.

SHROPSHIRE SCIENTIFIC BRANCH.

THE CROOKED CRANIA FROM WROXETER.

By Henry Johnson, M.D., Shrewsbury.

[*Read September 22nd*, 1863.]

Last year I wrote a paper on the distorted skulls found at Wroxeter, which was read before the Royal Society in May 1862. An abstract of that paper was printed in the *Proceedings of the Royal Society* for the same year. The distortion in question has been ascribed, on the one hand to congenital deformity, and on the other to "posthumous pressure". (Dr. Thurnam, *Crania Britannica*.) The conclusions at which I have arrived in the above communication are the following.

1. The distortion of the skulls found at Wroxeter is not *congenital*, but *posthumous*.

2. Pressure alone is not the cause of the deformity.

3. Besides the softening effect of continuous moisture, acting for ages upon the animal matters of the bones, there is proof that free carbonic acid very generally exists in soils, and more particularly in black mould, such as that of the orchard at Wroxeter.

4. Nitric acid may also be discovered in small quantity. But carbonic acid is almost always present in soil where air and moisture come in contact with organic matters in a state of decomposition. This is the principal cause of the solution of bone in the earth, rendering it softer, and more ready to yield to pressure.

5. The distortion must occur at a comparatively early period after interment.

Since my paper was communicated to the Royal Society, I have obtained some additional facts, which greatly confirm the conclusions above arrived at; and I will now briefly state them.

I. The following experiments, taken together, seem to me quite conclusive as regards the solvent action of carbonic acid, and the effect of this action in rendering osseous matter flexible.

Experiment I. (June 19th, 1862.) I obtained a slender piece of ivory, three inches long, and less than one-eighth of an inch square. It was passed through a perforated cork, and parallel with it was fixed a curved piece of watch-spring of the same length. The two ends of the ivory and the spring were then attached to each other by a bit of thin wire. The effect of this arrangement was, that the steel spring kept up a constant strain upon the piece of ivory, but not sufficient to bend or break it, in its present state. This little apparatus was then put into a soda-water bottle filled with distilled water, into which thirty-two atmospheres of carbonic acid were forced by pressure. The bottle was then well corked, and laid aside. It was soon apparent, from the troubled state of the liquid, that the ivory was undergoing solution; and also that it was gradually yielding to the constant gentle strain upon it. On November 13th, I removed the apparatus and the liquid from the bottle. The slip of ivory was bent like a bow; and the liquid, on evaporation to dryness, yielded 6.5 grains of carbonate of lime. There is no doubt, therefore, that the ivory had suffered solution and become bent.

But it may be objected, that pressure along with moisture would be sufficient for this, without the chemical or solvent action of the liquid carbonic acid.

I therefore repeated the experiment thus.

Experiment II. (April 1863.) I obtained another slip of ivory and another steel spring, both as like the former as possible. I fixed them in a cork, and tied their two ends together, as before, with fine wire. This apparatus was then put into a soda-water bottle filled with plain water only; and it was corked up and laid aside. At the end of four months (September 1863), the liquid remained clear, and the ivory remained straight, as at the beginning.

The obvious and fair inference to be drawn from these two experiments is, that the solvent action of carbonic acid upon bone disposes it to yield or become flexible, when moisture and pressure alone would have no such effect. I consider the two experiments together to be quite conclusive.

II. I have the pleasure to show this evening a deformed skull from Wroxeter, which has never been in the Museum, nor has it been exhibited any where. It came into my possession just as I was writing my paper on this subject last year. I bring it forward now, as affording a new and a very remarkable illustration of this peculiar kind of deformity. The occiput and front of the two parietal bones alone remain. But, even from this very imperfect portion of the cranium, it may be clearly made out that the body has rested with the head very much on one side (the right); and that this, being the lowest, most pressed by incumbent soil, and most acted upon by its contained acids and moisture, has been the part to yield the most to the operation of these causes, and become deformed. The right parietal and adjoining portion of the occipital bone appear to be flattened or crushed in, whilst the other side retains its natural convexity. It will be remarked, also, that the lower part of the skull is corroded or eaten away much more than the upper part, which is not deformed.

III. Dr. Daniel Wilson, in his able work on *Prehistoric Man*, has discussed the subject of cranial deformity, both during life and after death. His description of the Hochelaga skull would equally apply to those in our Museum; and his sketch of it might have been actually taken from one in our Salopian collection. He justly ascribes this distortion to posthumous pressure, rather than to congenital deformity or artificial bandaging during life. But he thinks moisture and pressure are the sole causes concerned; and, seeing that the Hochelaga skulls were buried little more than two feet deep, he deems it necessary to suppose that the pressure was aided by superincumbent buildings. (Vol. ii, p. 309.)

I am very glad to obtain an example of cranial dis-