he looked sallow and collapsed, his pulse was 130 and very feeble, and his scrotum and perineum hard and painful, and evidently on the point of sloughing; and after considering his state, and the probability of his sinking rapidly, if not relieved of the cause of the irritability of the bladder, as well as of the urine in the cellular tissue of the perineum, we determined to operate, and remove the bougie by the median section.

He was placed on a table, and tied up in the usual position for lithotomy; and I proceeded to operate, substituting two or three glasses of brandy and water for the chloroform, as I was fearful of the depressing effect of the anæsthetic, in a man so worn and weak as our patient was. The gentlemen whom I met in consultation, kindly gave way to my wishes in this respect, for I think that they were inclined to administer chloroform, and save the patient the half hour's torture which was inflicted upon him; but now that the case is concluded and the result has turned out as satisfactorily as we could possibly hope for, advocate as I am for chloroform in the majority of cases, I think that the danger which this gentleman went through would have been considerably increased by the use of that agent, particularly as I believe that on the former occasion he suffered greatly from sickness afterwards, and he appeared to me to be too much like a man likely to sink, to justify us in running any additional risk.

With the staff in the bladder and finger in the rectum, I ran a sharp-pointed knife through the lower part of the old wound and sloughing perineum into the staff, cut upwards so as to enlarge the opening, passed the probe into the bladder, and followed it up by the finger. The prostate felt very much constricted round the point of my finger; and, owing to the infiltration of urine in the perineum and consequent tumefaction, I could not reach readily into the bladder, so as to feel for the portion of bougie, which was, however, readily felt by the forceps.

After repeated trials with two or three kinds of forceps, and after bringing away little bits in the blades of the instrument, it was at last seized about the middle, rotated, and removed. The bladder was washed out with warm water, and the patient lifted back into his bed; and, although he had undergone nearly half an hour's severe suffering, during which his shrieks must have been heard at a great distance, it was at once obvious that his state was in every respect improved. His pulse had fallen in frequency, his pain had subsided, some of the anxiety of his countenance had disappeared, and, from the free opening of the former wound, and the manipulation the parts had undergone, the scrotum and perineum had lost their redness and tension by the leaking out of the urine and effused serum; and he expressed himself as relieved and comfortable. A tonic and stimulating plan of treatment was resolved upon.

The portion of bougie removed consisted of nearly three inches of what seemed to be a gum elastic catheter, dark brown in colour, doubled up and coated with a layer of phosphates, so that it came off in a distinct shell when the forceps laid hold of it.

From this time, for a fortnight, his progress towards recovery was uninterrupted; the wound was closing, and the urine began to flow in its natural channel, when a severe attack of diarrhoea, brought on by error of diet, retarded his progress for some days. This yielded to judicious treatment; and, when I last heard, all the irritability of the bladder had disappeared, the urine flowed chiefly through the urethra, and the patient was rapidly regaining his strength.

I did not see him after the day of the operation, and I therefore have to thank the gentlemen who attended him for many of the notes which have enabled me to draw up this case, as well as for their skilful care of the patient.

We have heard this expression used by older surgeons, "*the wholesome stimulus of the knife*;" and, in this instance, instead of the collapse and shock we generally see after a severe operation, the patient appeared so much roused and relieved, that he was obviously stimulated by the treatment he had undergone.

Lastly, my object in publishing this history is not only for the pleasure of narrating a successful case, but also for the sake of bringing forward what I consider to be a triumphant example of Allarton's operation; for the bougie was, in this instance, removed from the bladder without any injury to the deeper parts, and with no more incision than what was necessary to relieve the infiltrated perineum, and to these conditions, including the power which the patient retained from the first of holding his water properly, the rapid recovery which he made was undoubtedly due; and I think it very questionable whether he could have escaped with his life from the more serious perils of the lateral operation.

Gulstonian Lectures

ON

FEVER AND INFLAMMATION.

DELIVERED BEFORE THE

ROYAL COLLEGE OF PHYSICIANS, LONDON,
1859.

By WILLIAM ADDISON, M.D., F.R.S., Fellow of the College.

LECTURE I (continued).

III.—THE FLUID OR PLASMA OF THE BLOOD.

The plasma is a very complicated fluid. Its chief constituents are water, fibrine, albumen, colourless corpuscles, volatile matter, fatty compounds, and salts. In its passage through the capillary vessels it permeates all organs and tissues; and, at various points of the circulation, the parenchymatous depurating organs remove from it those substances, which, if retained in it, would injure its qualities. We find that numerous soluble compounds—substances, for instance, which have been taken as food or drink, and poisons received into the stomach—are absorbed into the plasma, whence they may be again eliminated or removed, changed or unchanged by the depurating organs—the organs of secretion.

Many of the common poisons have a local action as irritants, and also a remote or special action upon some parenchymatous organs; other poisons exhibit only the remote or special action. Cantharides has a special action as an irritant to the stomach; it also affects, remotely, through the plasma, the urinary organs. Morphia, taken by the stomach, affects specially the brain, through the plasma. Digitalis, taken by the stomach, affects the heart; strychnia the spinal marrow, through the same medium.

In experiments on animals with prussic acid, it has been found when death took place within a few minutes only, that the odour of the poison could be perceived in the cavities of the body; and again in other experiments, where preparations of antimony were injected into the blood by a vein in the thigh, the metal has been found in the coats of the stomach.

From these and numerous other facts, which it is unnecessary to particularise, we learn that poisonous substances, taken by the stomach, enter the plasma or mingle with the fluid of the blood; and thereby the poisoning, not of all, but of some one parenchymatous organ ensues, determined by the nature of the poison, and the special qualities of the parenchymatous elements of the different organs. But, if we compare the actions of these common poisons received into the body through the stomach, with the action of aerial poisons inhaled by the lungs, important differences will be found. In the former, the symptoms do not begin with fever, nor is any contagious matter generated in the blood; whereas both these phenomena are distinguishing features of the latter. Here, then, we have a ground for our argument, that the two parts of the blood have distinct pathological relations; for poisons taken by the stomach exhibit themselves by symptoms which proceed from some local parenchymatous organ, and they do not cause the production of a contagious matter in the blood; whereas poisons inhaled from the atmosphere by the lungs very often do so. Yet both species or classes of poisons act through the medium of the blood.

In 1832, numerous cases of cholera, then epidemic, were treated by saline injections, thrown into the blood in large quantities, not only without hurt to the patient, but in some instances with great apparent benefit. Among many others, there is a very remarkable case reported in the *Lancet* (vol. ii, 1831 and 1832), in which five gallons of saline liquid were injected by a vein, in four days.

The first injection was to the amount of nine pounds and a half; it was thrown into the circulation in the space of eighteen minutes. A few hours afterwards an additional ten pounds of the saline fluid were injected, with four ounces of albumen. This was at one of the clock on the morning of the 29th May; at half-past seven the same morning the injection was repeated to the amount of ten pounds, with the addition of ten grains of sulphate of quinine; at half-past eleven the injection was repeated to the amount of ten pounds. On the second of June, at half-past four in the morning, six pounds and a half of the saline fluid were injected, with six drops of a solution of morphia; and on the 19th of June the patient is reported to have left the hospital, well.

If we look around, we may see in all classes of society individuals of various conditions of body. We may contrast the florid complexion with the pale thin face; tissues laden with fat with the spare habit; those who luxuriate in good living with those existing on bread, potatoes, and water. Persons in each of these classes may be following their daily avocations in good health, yet the blood-fluid, we know, cannot be the same in all of them; nor can it be the same or have the same qualities in the same person, if he greatly alter his diet, his food and drink. In the chemistry of the blood, there are scarcely two analyses of it alike; and the milky serum sometimes seen in blood after venesection has been referred to articles of diet, or to the recency of a meal, which has for a time changed the qualities of the plasma.

These facts support or coincide with our argument that the blood must be regarded in respect to its pathology, as consisting of two distinct parts; and of these, that the plasma, or fluid, holds a position of different or inferior rank to the red corpuscles in the functions of life. It furnishes elements of growth and reparation to its containing vessels, the common tissue; and it is the medium in which the corpuscles swim; but it varies, within certain limits, in qualities and composition, from day to day, according to the nature and abundance of the food and drink; nay, further, it appears that it may vary, in quality and composition, from poisonous substances taken into the stomach, so as to occasion symptoms of poisoning in some local parenchymatous organ, before any of the symptoms of fever appear, and without evidence of the generation of any contagious matter in the blood.

IV.—DISTEMPÉRATURES OR DYSCRASIES OF THE PLASMA OR FLUID OF THE BLOOD.

There are varieties or changes of health—moods, tempers, and feelings—dependent upon qualities of blood which are temporary, multifarious, and fleeting. They are cured by attention to diet and the excretions; by good living in those who have fared badly, or are half starved; by abstinence and physic in those who have abused the good things of the table. These changes in the moods and feelings of the individual, have all the characters of dependence upon that part of the blood which is quickly replenished and altered by diet—namely, the plasma.

Also there are numerous forms of inflammation which are uncertain and multifarious—dependent upon qualities of blood occasioned by unwholesomeness of diet, privations, and neglect of the functions of the depurating organs—the skin, kidneys, and bowels. Sometimes the simplest wounds fester and ulcerate. Eruptions, pustules, or boils break out in the skin; or the slightest external injury provokes chronic and ulcerative forms of inflammation without fever, comprehended in the terms *scrofula* and *scurvy*. For example:—

Sailors at sea are dieted on salt provisions; and in hot climates are accustomed to tramp about the ship without shoes or shockings. Their feet and legs are consequently bitten by mosquitoes, and, when the men have been a considerable time on a salt diet, and in the hot climate, the wounds ulcerate. The ulcerations become larger every day, and will resist all kinds of local treatment, so long as the diet remains unchanged. But, upon a change of diet, and cruising in a cooler latitude, the ulcers heal spontaneously.

Under analogous conditions—of unwholesome or insufficient diet and confinement—fractures in a hospital will remain only partially united; but upon the patient's removal into the country, cure is completed.

When a patient undergoes a formidable surgical operation, and makes a good recovery, the blood is regarded as of normal constitution, free from any taint or distemper. On the contrary, when trifling wounds and accidents degenerate into chronic ulcerations, it is reputed unhealthy. And the unhealthiness or impurity may be limited to the plasma, or that part of the blood from which elements of repair are taken. At all events, it is a question or matter for inquiry, which part of the blood is most in fault in these cases. "A person shall have a sore upon the leg, which is granulating freely," says Mr. Hunter, "when all at once the granulations shall lose their life, and fade away. New granulations may afterwards spring up, and these shall undergo the same process, and so they would continue to go on, if some alteration in the nature of the parts be not produced." That is to say, some alteration in the plasma or fluid of the blood; differences in the nature of granulations being determined by differences in the qualities of the plasma. These examples are sufficient to shew—that indeed is well known—that forms of inflammation, suppuration and ulceration, are produced and kept up by distemperature or

unhealthiness of blood, and more particularly of its plasma. And that a depurative operation is often performed on the plasma, by forms of local inflammation, may be argued from the eruption of small-pox. In scarlet fever, that a contagious matter from the blood is discharged by the vascular action in the skin, may be concluded from the properties of the particles of the exfoliating epidermis. And in gout, that offending matter is discharged from the blood by the local inflammation, is also to be concluded from the morbid material deposited in the parts inflamed.

For demonstrative evidence of forms of inflammation dependent on distemperatures or dyscrasies of the fluid of the blood, we may refer to the *chef d'œuvre* of pathological anatomy, the great work of Rokitsansky, also to the lectures of Mr. Paget. Actual proof of alterations in the qualities of the plasma may often be obtained by venesection, in cases of inflammation. The speedy separation of the plasma, or sinking of the corpuscles, which occasions buffed blood, indicates a change in the relative qualities of the two parts of the blood. We have recorded the yellowish, greenish, and purplish hues, and the flocculated appearance like curdled soap in the plasma, of buffed blood before its coagulation in different cases of inflammation. And we have repeatedly observed with the microscope differences in elements of the plasma of blood, taken from within the sphere of inflammation, as compared with elements of the plasma of blood drawn exterior to it. It would seem, then, that abnormal qualities of the plasma promote forms of inflammation; and the disposition of the colourless corpuscles of blood to congregate and attach themselves to the coats of the vessels, we may suppose to indicate a way whereby disqualified or abnormal portions of the plasma are transferred to the common tissue for discharge.

In the first part of this lecture, we spoke of the severance of blood-vessels and other bonds of connection between sloughs and the subjacent texture without bleeding. In abscess and ulceration, from thorns and other foreign bodies impacted in the flesh, we showed that great changes take place in blood-vessels without bleeding.

In fact, in all cases of repair, where exudations and new growth appear, the blood-vessels engaged undergo a change from fibrous to corpuscular—their component elements retrograde. This change is exemplified in granulations, the vessels of which bleed upon the slightest touch. We have a perfect conviction that, in places of inflammation, from disordered qualities of the plasma, the coats of the blood-vessels undergo the same changes; for we find that corpuscular elements of the plasma form, not only the coats of new vessels which arise during inflammation, but also supplant the fibrous element of the coats of the older vessels, which must be opened to supply blood to the new ones; and, as the plasma is the part of the blood which plays the conspicuous part in these changes, so it is not difficult to comprehend how it may be relieved of hurtful material in a place of inflammation.

"That sores give rise to very different kinds of pus," says Mr. Hunter, "is very evident to the naked eye, and that the different parts of which the blood is composed will come away in different proportions we can make no doubt; and we find that whatever is in solution in the blood comes away more in one kind of pus than in another." The inference is, that inflammation exercises a therapeutical action in distemperature of the fluid of the blood. Hence, then, inflammation, exudations, granulations, and pus, may arise for two distinct purposes, namely: for the cure of mechanical injury; for the discharge of sloughs and foreign substances from the solid textures; and as a means of cure in distempered plasma.

In injuries to the common tissue, wounds, lacerations, contusions, and fractures, the process of repair comprises inflammation, granulation, suppuration, and ulceration; new blood-vessels are formed without bleeding, and there are discharges of pus. If physical hindrances interpose, the process is protracted and made chronic until they are removed. If they cannot be removed, the life of the person is endangered, and may be destroyed unless amputation be performed.

In distemperature or injury to the quality of the fluid of the blood, by unwholesomeness of diet, privations, or other causes, reactions of the same kind arise for its depuration. These also comprise inflammation, granulation, suppuration, and ulceration; boils, pustules, eruptions, and gout. If hindrances interpose—if the causes of the distemperature comprised in errors of diet, privations, etc., be not abated, the process is protracted and made chronic until they are removed, and in such cases, as in the sailor's before mentioned, to cure the local affections (the ulcers), the qualities of the plasma

must be altered or improved by a thorough change of diet or habits of life.

In the one group—injuries to the solid texture (surgical cases)—the reactions arise for the healing of wounds, the discharge of sloughs, dead matter, and foreign bodies. There is direct evidence of what occasions the action, what it accomplishes, and why it is protracted and dangerous. In the other group—disorders of the blood (medical cases)—the influence of the reaction upon the qualities of the fluid of the blood can only be inferred from collateral events; and these, in gout, small-pox, and the other exanthematous fevers, point unequivocally to the therapeutical characters of inflammation.

In perusing such cases as Mr. Lowdell's, we cannot fail of remarking the advantage the surgeon has over the physician, in being able to go safely beyond the things which are seen. At the bottom of fistulous and ulcerated openings in the flesh, beneath an inflamed and thickened integument, and through a thick crust of new grown bone, he is able to assist, or rather to accomplish the task nature has long been endeavouring to perform. He lays his hand upon the hindrance which has made inflammation chronic, plucks it away, and the person is restored to health. Likewise in other severe injuries, a compound fracture or a crushed joint, the surgeon surveys the whole of the injured parts, and he has time and opportunity, before therapeutical reactions set in—before inflammation, suppuration, granulation, and ulceration have commenced—to form a judgment of the most probable course of events; and if, upon consultation, serious doubts be entertained whether or not the cure should be entrusted to the natural course, he amputates the limb.

The physician is very differently placed. The inflammations he has to deal with arise from qualities in the blood itself; and when he has protracted and dangerous forms to deal with, he cannot lay his hand upon the cause of danger and take it away.

From the facility with which reactions between the fluid of the blood and its containing vessels may be studied in mechanical injuries, has arisen the *doctrine of repair*, daily exemplified in numerous examples.

But reactions of the same kind, from changes in the quality of the blood itself, owing to the difficulties surrounding their explication, have been separated from the ordinary process of repair. Our object will be to accumulate evidence of the propriety of bringing all reactions between the plasma and the common tissues, the process of repair and inflammation, into one—the physiological—category, and to shew that failure of success, in cases of inflammation of blood-origin, no more alters the nature or intent of the action, than does failure of success in necrosis of bone, and in other surgical cases. But further argument upon this matter must be reserved until we have spoken of the corpuscles of the blood.

V.—OF THE RED CORPUSCLES OF THE BLOOD.

The development of the red corpuscles of blood is doubtless conducted on the same principle as that of other cells. They take from the plasma, in which they swim, the materials requisite for their growth, and excrete the products that must be consequent on the act of absorption.

"The only hypothesis," says Dr. F. Simon, "regarding the preservation and growth of the blood-corpuscles, is that their increase in bulk is due to a reciprocal action between the young corpuscles and the plasma; and that, as independent organisms in circulation, every change which occurs in them must be accompanied by a simultaneous alteration in the plasma, from which they obtain their nutriment, and into which their excretions must pass." And of the excretions passed into the plasma, those of them which are injurious are withdrawn therefrom by the depurating parenchymatous organs—the secreting parts of the skin, liver, and kidneys.

Now if we treat the red corpuscles as independent organisms, swimming in the plasma, then any matter or substance, whether derived from the plasma or from the atmosphere, which is necessary to their sustenance, to their normal state and functions, may be regarded and spoken of as nutriment. That is to say, we may speak of the corpuscles of the blood as nourished by elements in the air, as well as by elements of the plasma; and, as respecting the matter they excrete or discharge, it is a part only of their excretions which is passed into the plasma: for certainly another part of their excretions is discharged into the air in the form of carbonic acid, by respiration. Let us pause for a moment to consider this matter. The leaves of a plant take in part of the materials of the nourishment of the plant from the atmosphere, and they excrete or discharge into the atmosphere elements that would be injurious to the economy

of the plant if retained in it. Also the rootlets of a plant take up other materials of nourishment from the soil, and they excrete into the ground matters which they do not want. In both these examples, in the roots and leaves of the plant, the bodies which perform these offices of absorption and excretion, are microscopic cells—organisms analogous, and in many respects similar, to the blood-corpuscles.

Animals inhale the air and discharge into it matters which are thrown out from the body by respiration; and, in their nutrition by diet, they cast their droppings or excretions upon the herbage, on which they must afterwards feed.

Unicellular animalcules, in a drop of water, derive from it elements of their nourishment, and also they must discharge into it the matter of their excretions. In a *vivarium* water is the medium sustaining different forms of life, and the fluid is preserved in a fit and proper state, because the excretions of the animal furnish nutriment to the bodies of vegetable life, and because, on the other hand, the excretions of the vegetable furnish elements of nourishment to the animal bodies: the excretions of one department of life furnishing food and necessities to the other department.

There is, therefore, nothing incongruous in the corpuscles of blood taking part of their nourishment from the air, and discharging into it a part of the matter of their excretions; and in their taking another part of their nutriment from the plasma, and discharging into it another part of their excretions. Nor, again, is there any incongruity in our finding that the plasma, or fluid of the blood, maintains its purity because the excretions of the corpuscles are ingredients upon which the functions of the depurating organs are exerted. Nor, finally, if with Zimmermann and Simon we should regard the fibrine of the plasma as an exuvial matter, or excretion of the corpuscles, is there any incongruity in finding it to be an essential material, used in the maintenance and repair of the common blood-distributing tissue.

As respects matter passing from the corpuscles into the plasma, we are able to show, by some remarkable experiments, which will hereafter be fully related, that molecular and tailed forms of some material substance may be seen issuing out of them and passing into the plasma, without much alteration of their form or colour; and, to any one witnessing the experiment, there can be no difficulty in concluding that the corpuscles, in their natural state, discharge matter into the plasma. It must be confessed that but little can be demonstrated of the vital and depurating processes constantly going forward in the blood of the living person. Nevertheless, in the absence of such demonstration, we are warranted, by the experiment just referred to, and by the undisputed teaching of physiology, in concluding that the corpuscles of blood are sustained in their vital and chemical qualities by the plasma and the air; also, that their excretions are passed, partly into the plasma and partly into the air. And, these properties of the corpuscles being established, there are some broad and acknowledged facts respecting venous blood and urea which claim our attention.

[To be continued.]

Periscope.

TOXICOLOGY.

DEATHS FROM DRINKING CHLOROFORM.

Two instances of reputed death from drinking chloroform have lately been recorded. One is the case of the late Dr. Glover; the other is reported in the *Lancet* of April 16th, by Dr. W. P. BAIN, of Poplar. The records are of much interest; and therefore we insert a record of the inquest, combining with it an account of the symptoms and *post mortem* examination published by Mr. GANT in the *Lancet* of April 23rd. We give also a copious abstract of Dr. Bain's contribution.

CASE I. On Wednesday, April 13th, Mr. Wakley, coroner for West Middlesex, and a respectable jury, assembled at the Prince Albert Tavern, Kensington Park Road, Kensington, to investigate the circumstances attending the death of Dr. Robert Mortimer Glover, aged 42, late Physician to the Royal Free Hospital, and the author of several medical works and papers.

Mr. WILLIAM GLOVER deposed that he resided at Wallbottle, near Newcastle-on-Tyne. The deceased was his brother. His name was Robert Mortimer Glover. He was a doctor of medicine, and aged about 42. His brother resided at 4, Ken-