So Reynolds, his friend, seems to tell of him. In that masterpiece of portraiture, which teaches like a chapter of biography, Hunter is not shown as the busy anatomist or experimenter pursuing objective facts. The chief records of his work are in the background; he is at rest and looking out, but as one who is looking far beyond and away from things visible into a world of truth and law, which can only be intellectually discerned. The clear vision of that world was his reward. It may be the reward of all who will live the scientific life with the same devotion and simplicity."

I believe there are men amongst us who so love nature they might prove, even to Mr. Ruskin, that the microscopic cells and the spiral fibres seen in the dissection of the plant possess beauties of their own, and are but the elements which, when grouped together, form the shape of the branches of the trees and determine the clustering of the foliage, which in this stage of development alone, he imagines, can inspire him by their charm. One might even almost hope that the repugnance with which chemistry, equally with anatomy, inspires him would disappear when shown the production of colours in the laboratory; and that, combining henceforth this newly acquired knowledge with those sentiments which enable him so eloquently to describe the autumnal tints of the forest, he might at length be at one with Shakespeare: that art is not added to nature, but that art itself is nature. What I should like to insist on is, that the material world can be examined in many ways; it may be regarded in an analytic and scientific spirit, or with the eye of the poet; but as every quality which the mind can conceive must be an attribute of nature, one view need not destroy the other; and more than this, they are often but the two sides of the shield, or even identical. For example: when the physiologist sees a boy walking along the road whistling, he says that, as the forces produced in the boy's nerve-centres are not being employed in intellectual processes, they make their escape by whistling, just as a steam-engine blows off the steam with a great noise when not doing useful work; the poet wonders at the scientific man's materialism, and exclaims "the plough-boy whistles as he goes for want of thought". One of the most remarkable examples, in my opinion, of a man who possesses both a scientific insight into objects around him, and at the same time the true artistic and poetic mind, is the Professor of Anatomy at Boston, to whom I have already alluded. I should say that Wendell Holmes has the faculty, more than any other author whom I know, of analysing human sentiments and showing their association with the material world around us. In some of his writings and poems, it were difficult to say whether the physical, the chemical, the physiological, or the purely spiritual idea dominated; and indeed must not all these, and more, be united in the mind of the Creator of all things, or be phenomena, if you will, of the underlying substance. In a poem describing the death and burial of a child, all these attributes may be seen, the last verse running thus—

"At last the rootlets of the trees
Shall find the prison where she lies,
And bear the buried dust they seize
In leaves and blossoms to the skies;
So may the soul that warmed it rise."

I have heard a preacher in his pulpit, after speaking somewhat disparagingly of science, declare that the child who plucks a flower and places it in her bosom knows more of the flower than the botanist who dissects it. It is no doubt true that the child may regard it with a reverence which seems incompatible with its destruction; but a knowledge of its structure in detail by no means diminishes the love for it as a whole. But this need not be; for Wendell Holmes, speaking of a character in one of his novels, whose sentiments assuredly betray the author himself, says: "He had kept in a singular degree all the sensibilities of childhood, its simplicity, its reverence. It seemed as if nothing of all he met in his daily life was uncommon or unclean to him; for there was no mordant in his nature for what was coarse or vile, and all else he could not help idealising into its own conception of itself, so to speak. He loved the leaf after its kind as well as the flower, and the root as well as the leaf, and did not exhaust his capacity of affection or admiration on the blossom or bud upon which the poet lavished the wealth of his verse. Thus nature took him into her confidence. She loves the men of science well, and tells them all her family secrets—who is the father of this or that member of the group—who is brother, sister, cousin, and so on, through all the circle of relationship. And there are others to whom she tells her *dreams*: not what species or genus her lily belongs to, but what vague thought it has when it dresses in white, or what memory of its birthplace that is which we call its fragrance."

I have felt reluctant, and even almost ready to apologise, for attempting to vindicate the high calling of men of science, and defend them against a widespread feeling as to the degrading pursuit of searching into the mysteries of the material world. I should not have ventured to do so did I not see our drawing-room tables covered with magazines

and high-class literature, as it is called, in which some of the greatest men in our country—men of European reputation, men whose names will be handed down to posterity as the pioneers of knowledge, men of the same stamp as our own immortal Harvey—are not only held up to contempt, but their teachings described as degrading or even demoralising. Of course, these writers are blind; they have not their eyes open to the wonders around them; or, if they hold any opinion as to the meaning of the world, it is associated with some philosophical or religious dogma which has formed its foundation. But scientific teaching must have its way; for, as we believe, all parts of the world are held together by one force (and what is true of one portion is true of another), so scientific men must be pleased to see that the doctrine of evolution, first taught by them regarding material things, is seen to be a law pervading the world, and is now being made applicable to man in his mental and spiritual nature, both by moralists and divines. For if, as many hold, the imagination of man is but a reflection of the world around him, then evolution is as true as the older theories of a perfect world undergoing decay; for the scientific man knows that life and death are but correlative terms. Scientific pursuits are ennobling, and accompanied by pleasure of the purest and highest kind. Nature reveals her secrets only to those who wish to discover truth; for, while the dishonest man is repelled, and his reward is infamy, to the earnest investigator nature becomes a moral teacher. Science conducts us through infinite paths; it is a fruitful pursuit for the most poetic imagination. We take the world as we find it, and endeavour to unravel its mysteries; but of the alpha and omega we know not. Enough for us to look at what is lying around us; it is a part we see and not the whole, but we can say with the poet: "We doubt not, through the ages one increasing purpose runs."

I will detain you no longer; what more can I say? What grander image, what more glorious picture, can I set before you than that which we have come to contemplate to-day: the king's physician searching out the secrets of nature?

THE SIGNIFICANCE OF THROMBOSIS OR BLOOD-CLOTTING.*

By ROBERT BARNES, M.D., F.R.C.P.,

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I HAVE often taken occasion to show that the study of obstetrics throws the most useful light upon many problems in pathology. In this study we possess one inestimable advantage. In general medicine and surgery, the subjects of clinical observation mostly come before us when their diseases have made more or less considerable progress; when various complications have arisen; when, consequently, the solution of any given pathological problem has to be pursued through a number of interfering factors, through all the contradictions and mazes of history; when, in short, the sources of error are indefinitely multiplied.

On the other hand, the study of pathology through obstetrics is constantly presenting us with observations which have nearly all the conditions of simple physiological or laboratory experiments. We start with a healthy subject. The induction of pregnancy—still a physiological condition—is the first step in the experiment. Then we observe the changes wrought in the blood, in the nervous system, and on the various organs and their functions under this new condition. We see the system is put upon its trial. If sound, and if no heterogenous morbid element be introduced, the woman comes out of her trial unscathed. All returns to the ordinary physiological state. But we know too well that the changes wrought in the constitution of the blood, and in the nervous centres, in many cases approach so closely to the borderline between physiology and pathology, that a very slight accident will precipitate the transition from health to disease. Now, the course of study indicated is: first, to take note of the conditions induced by pregnancy; secondly, to seek for the accidental conditions supervening upon the pregnancy; thirdly, to trace the succession of phenomena resulting.

I have applied this method to the illustration of the convulsive diseases of women in the Lumleian Lectures, delivered before the College of Physicians in 1873, and to the illustration of other pathological problems, in various addresses, delivered in New York, Birmingham, and Manchester. I now propose to cast a very short and superficial glance, from the same point of view, at the significance of thrombosis, limiting myself to one problem only, purposely excluding embolism. Thrombosis

* Read before the North London District of the Metropolitan Counties Branch.

arises in the course of many diseases, acute and chronic; and, in many of these cases, the antecedent conditions and immediate causes have been traced with consummate skill to brilliant success. I need hardly refer to the researches of Virchow, Cohnheim, Richardson, Schiff, and many other pathologists.

We need not go into minute differential analyses of the blood in the non-pregnant and in the pregnant woman. The main distinctions, traced by Andral and Gavarret, are well established. It will be enough for our purpose to call to mind that, in pregnancy, the blood is more watery, contains a smaller proportion of red corpuscles, usually a greater number of white globules, and that it is constantly loaded with a larger proportion of fibrin, which must be regarded as an excrementitious element. To this general description, we may add that the blood is also liable to constant invasion of waste products of nutrition, coming from the mother's own system and from that of the embryo. These waste products will exist in variable proportions at different times, according to variations in diet, exercise, in the rapidity of nutritive processes, and in the working powers of the secreting and excreting organs. So long as the lungs, heart, and the glandular system are in good working order, the excrementitious matters are easily eliminated, and the healthy balance is maintained. But so soon as the eliminating part of the organism is impaired in its action, there will be a gathering of noxious materials in the circulation, the first effect of which will be exerted upon the blood itself. The blood, in short, is poisoned. It is chemically affected. And, according to the nature and quantity of the noxious material and the state of the system at large, or of particular organs, and no doubt also according, in some cases, to inherited diatheses, different reactions will ensue, assuming more or less definite pathological features.

We may assume, in passing, that in all these cases of blood-poisoning the circulation is affected dynamically: that is, the heart and blood-vessels act with greater rapidity and difficulty; and also that the nervous system is more or less disturbed. But it is enough, at present, to limit our attention mainly to the blood itself. It is well known to those—they are not, however, many at the present day—who have bled pregnant women, how readily the blood drawn coagulates, and how marked is the cupping and buffing. This is due to the excess of fibrin, resembling in this respect the blood of rheumatic fever. Proneness to clot, then, is the ordinary character of the blood in pregnancy. It is more disposed to clot in the vessels than is the blood of non-pregnant women. This is the first factor in the problem. What are the subsequent factors? Blood out of the body clots; 1, because it is exposed to the air; 2, because it is no longer kept moving as it is whilst in its proper vessels; and probably under other influences.

Another question is, At what time does thrombosis usually occur? Clinical experience answers this question very decidedly. In by far the greater number of cases, thrombosis declares itself after labour, and generally after the lapse of several days. This will lead us to inquire: What are the new conditions left by labour and arising during the puerperal process? We may note, first, an almost sudden diminution of nerve-tension. There is a revulsion in the psychical condition; a change in the spinal system, of which the most striking feature is the lowering of the reflex or diastaltic irritability. Corresponding with this, we find a marked diminution of the vascular tension. The sphygmograph, which before labour showed tension as high as that attending advanced Bright's disease, quickly gives a tracing of a quite different character. The frequency of the heart's action is considerably lowered. This lowering of nervous and vascular tension takes place very quickly after labour. Intimately related to this lowered nervous and vascular tension are two events: 1. The sudden cessation of the great developmental work going on in the uterus which had called for the exalted tension and increased quantity of blood; 2. The shedding of a greater or less proportion of this increased quantity of blood. There is always some hæmorrhage, and not seldom, as we know too well, a profuse, even dangerous, loss.

This sudden drain of blood induces enormous activity of absorption. And absorption is not always discriminative. It takes up noxious matter as well as healthy.

But the blood is not materially altered in its constitution until after two or three days have elapsed; that is, until the process of involution of the uterus and of other structures which had undergone a special development to fit them for the work of parturition has set in. Then there is a rapid impouring of effete matter into the circulation, a sudden strain thrown upon the glandular system to discharge it, and a diversion of vascular developmental activity from the pelvis to the breasts. The breasts thus perform a double duty. As well as secreting food for the infant, they act as excreting organs, and by keeping all the functions in harmonious balance. If the action of the breasts be suppressed, more work is thrown upon the other special excreting organs; and there is

the greater probability of the accumulation of noxious matters in the blood. Accordingly we see that, in women who will not, or who cannot, suckle, puerperal complications, as fever, pelvic inflammations and mania, are far more frequent.

Now, what is the relation of these facts to the problem immediately before us, the theory of thrombosis? Why, in the first place, is thrombosis so very rare during pregnancy? At this time, the excess of fibrin in the blood is at its maximum. It is highly coagulable. Why does it not coagulate? Something is wanting to precipitate the fibrin. This something we find in the sudden irruption of effete matter, and in the product of involution, a process which does not begin until after labour. It is in excess of that quantity which the excretory organs can discharge. If this excess be very great and acting upon blood, perhaps deficient in coagulating power, the whole circulating mass is invaded; and septicæmic puerperal fever is produced. But, if the excess be in moderate proportion, it is met by quick coagulation near the seat of ingestion, and thus is prevented from seriously affecting the general mass of blood. Thrombosis thus is a conservative process. Precisely the same order of events is seen in the lymph and lymphatics which play so active a part in absorbing the waste products of uterine involution. But the lymphatic glands further aid the conservative process of thrombosis by delaying the effete matter in its passage towards the heart, and by subjecting it probably to some kind of metamorphosis which deprives it of its noxious properties. Healthy thrombosis or phlegmasia dolens may follow the simple entry of the ordinary physiological fatty *débris* of the superfluous uterine tissue. But in a large proportion of cases the precipitating agent is something more decidedly noxious. If the uterus have contracted imperfectly, if any bits of placenta or decidua remain adherent, if clots be retained, then, decomposition or disintegration going on in the cavity of the uterus and in its sinuses, there is a direct supply of septic irritating matter. This, entering the veins and lymphatics in the broad ligaments and the internal iliacs, causes coagulation. This coagulation serves as a secondary barrier against invasion of the circulation at large; the uterus, which by firm contraction should be the first barrier, having failed. The thrombosis in the pelvic vessels is probably favoured also by the comparative slowing or retardation of the blood in them, due in some measure to the pressure of the enlarged uterus upon them. But there are many facts which point to the contact of septic matter with the blood as the immediate or efficient cause. The experiments of Gaspard, Henry Lee, and others show that the injection of septic matter into the living blood is a sufficient cause. Clinical observation adds confirmatory facts.

The entry of septic matter into the blood is notoriously attended by signs of constitutional shock; the most prominent of which are rigors followed by fever, and next by attempts at elimination. Rigors may generally be observed as the precursors of thrombosis. In one case especially, I watched a succession of thromboses, and every one was ushered in by shivering. This probably means that some of the noxious matter makes its way into the general mass of blood, breaking through the protecting barriers of the venous thrombosis and the lymphatic glands. The repetition or extension of thrombosis may sometimes be stopped by washing out the uterus, and especially by the use of quinine, ergot, and other agents which provoke the uterus to contract. Thus the supply of septic matter is cut off. We see analogous facts in the course of malignant disease of the uterus. Thrombosis of the pelvic veins is not uncommon towards the end of this disease. It is never, at least so far as I have seen, observed before the stage of ulceration has begun. Until this has begun, the subject may exhibit all the outward marks of blooming health. But when it has set in, that is, when a raw surface is covered by decomposing necrosed tissue and foul discharges, absorption takes place, and the blood in the pelvic vessels may coagulate. Before this event, we have evidence of blood-empoisonment in the so-called cancerous aspect and cachexia. Now, I have seen the cachexia and thrombosis so arising gradually removed after amputation of the offending mass, thus substituting a comparatively clean granulating surface for that which yielded the foul empoisoning material. And I have seen, when ulceration and necrosis have returned, as return they will, a renewal of the thrombosis and cachexia.

Here, too, the thrombotic process is probably favoured by the stagnation of the blood in the vessels of the broad ligament, caused by the matting of all the tissues by the spread of the disease and by the attendant inflammatory exudations. And the antecedent hæmorrhages and other conditions have induced the hyperinosis of the blood which is so important a condition of clotting and so conducive to absorption. There is another illustration of this local septic origin of phlegmasia dolens, of which I have seen several interesting examples.

In two cases of ovariectomy in which I tied the pedicle with strong whipcord and returned it into the peritoneal cavity, an inflammatory swelling arose after a few days in the iliac fossa of the pedicle side, and

following upon this some degree of febrile irritation, and then phlegmasia dolens of the same side was developed. These cases were conducted under the antiseptic method. The phlegmasia dolens gradually subsided. Both made good recoveries.

In rheumatic fever, we find another illustrative example. Indeed, this disease and pregnancy present, perhaps, the two most striking examples of quickly induced hyperinosis. In rheumatic fever, then, we have large excess of fibrin. To cause coagulation, a chemical irritant is wanted. This is found in the acid or other products retained in the blood. Fibrin becomes precipitated on the valves of the heart.

One condition seems common to most of the forms of thrombosis: that is, more or less sudden overpowering of the excreting organs, involving retention of matters that should be ejected. Thus, we frequently observe as an immediate cause of thrombosis, suppressed action of the skin from exposure to cold; and the thrombosis which in some cases follows quickly on physical and mental shock may be explained by the sudden arrest or disturbance of glandular action.

Cruveilhier distinguished two forms of what we now call thrombosis: 1. Adhesive phlegmasia; 2. Suppurative phlegmasia. In the first or adhesive form, we see the healthy conservative process of thrombosis blocking the entry of poisonous matter into the general mass of the blood and sequestering it in the veins invaded. In the second or suppurative form, we see the failure of the conservative or blocking process. There is thrombosis, but the clotting is imperfect. This is generally the case in the thrombosis which precedes death from cancer of the uterus. Wanting in firmness, probably from the beginning, in fatal cases (and it is most commonly fatal) the clots are found soft, pulsatious, easily breaking down, running into puriform fluid, and often extending far down the femoral veins and high up the vena cava. These cases are characterised by an earthy aspect, low fever, and general depression; in these respects contrasting with the general condition observed in the conservative form. The local characters are not less distinct. The conditions of the affected limb in pure phlegmasia dolens are well known. The leg is tense, greatly swollen, firm, resisting pitting, white, and shining. In the unhealthy "suppurative" form all is different. The leg is less swollen, it is puffy, doughy, pitting on pressure, the skin is dull in colour, and it is not tense enough to shine.

The first form tends to recovery; the second to death. In the first form, the great glandular organs are healthy; in the second, they will often be found diseased; that is, the liver and kidneys are affected with lardaceous or other chronic degeneration. These degenerations or other imperfections of the liver and kidneys are a chief cause of the mortality of puerperal fevers, and of some cognate deaths after ovariectomy.

I will not intrude upon you other analogies. Many will present themselves to your minds. I will only hint at the close pathological relations between these cases of so-called phlegmasia dolens in childbed women and septicæmic puerperal fever, pelvic cellulitis, and pelvic peritonitis and inflammations of other serous membranes.

Phlegmasia dolens may be taken as the type of what I long ago proposed to call the "autogenetic" puerperal fever, in contradistinction from those fevers which owe their origin to empoisonment from without, the "heterogenetic" fevers. But we must not forget that phlegmasia dolens may ensue upon the ingestion of foreign poisons.

The great clinical lessons illustrated and enforced by the very imperfect remarks which I have been invited to submit to you are these.

1. The origin of phlegmasia dolens in lying-in women can mostly be accounted for by processes springing up in her own system.

2. The blood of the recently delivered woman is in a state highly prone to coagulate.

3. It will coagulate when it is invaded by effete materials or septic matter in undue proportion to the excretory power of the system.

4. Such undue proportion will accumulate when the free action of the great excretory organs, the breasts, lungs, liver, kidney, skin, and mucous membrane of the intestines is greatly impaired by chronic antecedent imperfection, or is suddenly checked under the influence of cold, emotion, or other form of shock.

To anticipate these causes, to prepare and to keep the glandular system in good working order, to prevent the accumulation of poisonous matter in the blood, is the obvious indication, one which we ought to be able in most instances to carry out.

The theories or hypotheses of thrombosis arising under conditions other than puerperal must be in harmony with what is observed in puerperal thrombosis.

THE CHINESE AMBASSADOR.—His Excellency and suite and upwards of five hundred ladies and gentlemen honoured Professor and Mrs. Flower with their company on Saturday week in the Museum of the Royal College of Surgeons, when the whole of the institution was thrown open to them.

CHAULMOOGRA OIL IN LEPROSY.

By WYNDHAM COTTLE, M.A., M.B.Oxon., F.R.C.S.Eng., etc.
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THE following cases are, I think, especially interesting on two grounds: that they illustrate the use of a comparatively little known remedy, and are a record of an early stage of elephantiasis Græcorum occurring in England.

CASE I.—T. W. is now eighteen years of age. His father, an Englishman born in England, went to India. His mother was born in that country of English parents. He affirms that his parents and his three brothers, with whom he lives in London, are free from disease; and that there is no history of skin-affection in the family. Born in Calcutta, he resided and travelled in India until November 1875, when with his family he moved to London, where he has since remained in comfortable circumstances. In England, he has always lived well; and he tells me that in India his food was much the same, with no excess of fish.

The first symptom of the disease showed itself in June 1877, as a spot as large as a sixpence over the angle of the jaw on the left side, the site of which was marked by a dark stain. Previously to this, his health had been excellent. The development of this spot was followed by pains in the limbs that lasted about two months. He then noticed that the right fore-arm on its outer aspect had become marked with a brown discoloration. From August to October 1877, small round tubercles, dark coloured, about the size of split peas, with somewhat depressed centres, appeared on the backs of the hands. Similar tubercles showed themselves over the face; but in these the central depression was absent, and the colour lighter. Conjunctival injection took place from the first attack. These symptoms persisted and increased. Tubercles of like character developed on the feet; and, in May 1878, patches of brown staining, which at first were of a dull red colour, swollen and hyperæmic, were visible on both arm and legs. The back of the right hand and portions of the right leg were also distinctly anæsthetic.

In October 1878, his condition was as follows. He had tubercles, as described, on the face, the backs of the hands and feet, and the inner surface of the lower lip, with one on the left conjunctiva. The limbs, especially on their outer aspects, were deeply pigmented, dry, and scaly, most marked on the right side. The back of the right hand and the outer surface of the right leg were anæsthetic. The finger-joints were also uniformly enlarged. There was no loss of hair, and the ears were unaffected.

At the end of March 1879, all these symptoms had passed away, except a more limited and less pronounced anæsthesia in the above mentioned parts, and somewhat raised dark spots on the face and backs of the hands, corresponding to the positions occupied by the tubercles, with some thickening of the finger-joints.

From March 11th till September 18th, 1878, all the ordinary remedies were employed, but the disease steadily advanced; when I administered chaulmoogra oil in five-minim doses twice daily. The patient experiencing no inconvenience, I successively increased the dose to ten and twenty minims three times daily, then to forty and sixty minims thrice a day, which he is now taking. The disease began to mend from the time the chaulmoogra oil was given, and very much more rapidly with the larger doses, the improvement being noticeable week by week during the last six weeks, while he has been taking the oil in drachm-doses. I also directed him to apply daily to the affected parts an ointment of twenty grains of chaulmoogra oil to an ounce of lard.

CASE II.—T. M. was born and spent his youth in England. After residing twenty-seven years in Jamaica, he returned to London in November 1877. He noticed the first symptoms of his disease in May 1878, when large patches of discoloration appeared on his legs, followed by similar spots on the face and arms. A tonic treatment was first employed; and in September 1878 chaulmoogra oil in small doses was given, which was increased to twenty minims three times daily. This he continued to take till March 10th, 1879, when I first saw him. He stated that his condition improved when he commenced to take the oil, but the complaint recurred in a more marked degree.

On March 10th, 1879, he presented the following appearance. He was hale and well nourished. There were dusky red raised patches, two or three inches in diameter, scattered over the face, neck, body, and limbs, with the characteristic leonine expression of countenance and thickening of the ears and of the tissues in the positions occupied by the spots. A superficial ulcer existed on the outside of the left leg, and one spot on the right thigh; and the insides of the feet from the great toes to the heels were anæsthetic.