titia more or less expanded and rendered translucent by the imbibed fluid; and although, without doubt, when the arterial walls undergo true hypertrophy, there is a proportionate increase in the thickness of both the muscular layer and the tunica adventitia, the width and the hyaline appearance of this tunic depend, not upon the degree of its hypertrophy, but upon the extent to which it has become distended by imbibed fluid. This imbibition of fluid may occur as a result of maceration of the vessels in the subarachnoid fluid after death, but it is especially favoured by immersion in glycerine or in dilute acetic acid. In some specimens, so great is this *post mortem* imbibition of fluid, that the muscular coat may be seen to be irregularly pushed inwards towards the canal of the artery, which consequently appears to be much narrowed. Acetic acid produces the hyaline appearance in the tunica adventitia with extreme rapidity, as may be proved by the following experiment. Place a portion of pia mater on a glass-slide in water or glycerine, and cover it with thin glass in the usual way. The tunica adventitia of the arteries will be seen in close contact with the muscular layer, and having a fibrous appearance, with a wavy outline. Now put a drop of acetic acid at the edge of the covering glass, and allow it to run in, watching the effect beneath the microscope. As the diluted acid comes into contact with the arteries, their external tunic will be seen to swell up and become transparent, while the muscular coat is often irregularly pushed inwards. The vessels thus rapidly assume the appearance which is more slowly produced by glycerine. In this way, a hyaline condition of the tunica adventitia, not to be distinguished from the appearances described and depicted by Sir William Gull and Dr. Sutton, may with ease and certainty be generated in the course of a few seconds. The appearance of the tunica adventitia, thus acted on by acetic acid, is well represented in a woodcut at p. 486 of Kölliker's well known *Manual of Human Microscopic Anatomy*, 1860.

While the authors of the paper have based their new theory and nomenclature of Bright's disease upon an erroneous interpretation of the appearances to which I have referred, they entirely ignore the existence of hypertrophy of the muscular coat of the artery, which yet is conspicuously present in many of their own specimens. I showed Sir Wm. Gull a specimen of my own, in which the muscular coat of the artery was about three times the normal thickness for a vessel of that size. He maintained that he saw only a healthy artery. In one sense this was true, since the walls of the artery were composed of only normal tissue, which was, however, excessive in quantity, as Sir Wm. Gull would have seen and admitted if he had accustomed himself, as I have done, to compare the relative thickness of the muscular coat in strictly normal and in hypertrophied arteries (compare Figs. 2 and 3).

Fig. 2.—Normal artery from the skin.

The authors of the paper maintain that, from some not yet ascertained cause, an arterio-capillary fibrosis in the various tissues throughout the body is the primary condition of Bright's disease. I, on the contrary, agreeing with all modern pathologists that the disease

Fig. 3.—Artery from the skin in a case of chronic Bright's disease. The muscular coat hypertrophied.

is always of constitutional origin, believe that the proximate cause of the various forms of Bright's disease is some morbid condition of blood. In the case of the small red kidney, this morbid condition is closely allied to the gouty cachexia, and is often associated with chronic alcoholism. The glandular tissues of the kidney suffer in the discharge of their excretory functions, and the organ wastes and contracts. The blood is then rendered secondarily impure by retained urinary excreta, and it is otherwise altered in its composition. This morbidly changed blood excites unusual contraction of the minute arteries, by which the

circulation is impeded; the left ventricle, on the other hand, beats with increased force to drive the blood through the resisting arterioles. The result of this antagonism of forces is that the muscular walls of the minute arteries throughout the body, and those of the left ventricle of the heart, become simultaneously and equally hypertrophied.*

In studying the pathology of the minute arteries, care must be taken to distinguish between hypertrophy of the muscular walls—by which is meant an increase of normal muscular fibre—and the waxy form of degeneration which occurs in the advanced stage of that form of Bright's disease which is associated with the large waxy or lardaceous kidney (see Fig. 4). The arteries in this waxy condition have their walls infil-

Fig. 4.—Artery from a lardaceous kidney. The walls thickened and waxy.

trated by an albuminous or fibrinous material, which gradually obliterates all trace of normal muscular tissue. Careful observation of this form of arterial degeneration has led me to the conclusion that, as a rule, it supervenes upon the true hypertrophy of the muscular walls; and the gradual transition from one to the other may be readily traced and demonstrated. In like manner, granular and fatty degeneration of the muscular walls of the heart is a common sequence of true hypertrophy.

The specimens to which I have referred in this communication will be exhibited at the *conversazione* of the Royal Medical and Chirurgical Society on Friday evening, the 7th instant, when an opportunity will be afforded to compare my specimens with those of Sir Wm. Gull and Dr. Sutton. If the result of that comparison be not deemed conclusive by the majority of the Fellows and their visitors, I would suggest that the President and Council of the Society appoint a Scientific Committee to examine and report upon the specimens. As Sir Wm. Gull remarked after the discussion on the 28th ultimo, our object in this inquiry is not victory in controversy, but the establishment of truth.

ON HÆMOPHILIA.

By J. WEST WALKER, M.B.Lond., Spilsby.

THE following family history is interesting, as furnishing examples of Hæmophilia, a disease which has recently been brought prominently before the profession in this country by Dr. Wickham Legg. I intimately knew the father and mother anterior to their marriage eleven years ago; and both before and since that event have been their constant medical attendant. I fail to trace any facts bearing upon the important question of hereditary character, and am inclined to think the present an instance illustrative of the first start of a pathological condition which, there is every reason to fear, will be transmitted to descendants. The ultimate cause of the phenomena is involved in obscurity. As, on the one hand, some, so to speak, unhealthy selection seems to bring about the development of this singular morbid process—so, on the other, a more healthy selection, through more or fewer intermarriages, tends to affect its diminution and ultimate eradication. Hence, notwithstanding the hereditary tendency is a most important and diagnostic feature, we often fail, happily, in our endeavours to trace it in full force through more than a limited number of generations.

The father is a clergyman of the Church of England, and master of a grammar school. He is very tall—6 feet 4 inches—and thin. He is a hard-working and somewhat delicate looking man, and carries with him the appearance of worry and anxiety. He has never since I have known him had any serious illness, but he occasionally suffers from headaches, which find relief in epistaxis. His age at marriage was thirty-nine. He is no relation to his wife, and he never heard of a bleeder in his family. His father, a clergyman, died at the age of sixty-two of heart-disease; his mother at the age of seventy-four of general decay. She was a remarkably healthy active woman up to seventy, when she experienced an attack of hæmorrhage (hæmatemesis?), which left her weakly and with health impaired during the

* For a more detailed explanation of the physiology of the cardio-arterial hypertrophy, reference may be made to my paper in the 51st volume of the *Medico-Chirurgical Transactions*; and to a paper in the *BRITISH MEDICAL JOURNAL*, April 16th, 1870.

last four years of her life. He has three brothers, all married, two with children (no bleeder), and two sisters unmarried.

The mother is a perfect model of a healthy woman. She is fair, stout, and somewhat short—a contrast to her husband. She married eleven years ago at the age of twenty-six, and has since borne seven children and had two abortions. Her labours have been natural; and neither at those times nor at menstruation has hæmorrhage been excessive. She is an excellent nurser. She has never had any serious illness, and always lived in the midst of good sanitary surroundings. She knows of no bleeder among her relations. Her mother, living and aged 72, has been twice married, and had by her first husband (1) twins, a girl and boy, both of whom died within the month; (2) a boy, who died in infancy; (3) a boy, who is now living, aged 48, with six children—no bleeder. By her second husband she had three girls: the first died young; the second is the lady in question; the third is living, aged 34, unmarried. Her father is living, aged 67, and has always enjoyed good health.

The children of this marriage are delicate looking, though intelligent and lively. They were all born at the full time and in a healthy locality. They are as follows:—

1. A girl, aged 10, born December 17th, 1861, not a bleeder.
2. A boy, Charles, aged 9, born April 6th, 1863, a bleeder.
3. A boy, Edward, aged 7, born August 19th, 1864, a bleeder.
4. A girl, aged 6, born January 24th, 1866, not a bleeder.
5. A boy, George, born June 15th, 1868, a bleeder, lived sixteen months, and died after scarlet fever.
6. A girl, aged 2, born November 5th, 1869, not a bleeder.
7. A boy, Gerald, aged 1, born February 1871, a bleeder.

Charles first showed bruises when two months old, and has from then to the present time constantly presented them. The bruises occur on any part of the tegumentary surface, and are often large, extending, in some instances, from shoulder to elbow, or from hip to knee. They are very painful, the pain being paroxysmal, with violent nightly exacerbations. The child will lose blood in this manner in quantity sufficient to produce great weakness, and to blanch the skin and mucous membrane. Frequently the bruises can be traced to injury, often, however, very trivial; in some instances they seem to be spontaneous. In 1864, at the age of 16 months, the first attack of external bleeding took place. It commenced from the nose, but during the same week he fell, injured the upper gum, and bleeding ensued. The nose-bleeding soon ceased, but that from the mouth continued a fortnight, bringing the child to the verge of death. The bleeding came to an end, as it were, spontaneously; a rapid recovery followed. In 1865, bleeding again started from the gums after injury. This attack, not so violent as some, lasted probably a week, but was succeeded after an interval of two months by a fresh outbreak, which continued about the same length of time. After this he remained free until the following January (1866), when he bled for three days from a wound of the upper lip. He continued to have bruises, but had no serious external hæmorrhage until 1869, when he took scarlet fever. In the course of the complaint he was delirious, and had two attacks of epistaxis. Convalescence was tardy and critical, protracted by glandular inflammations, abscesses, and aphthous conditions. During this period he bled twice from the mouth, the hæmorrhage lasting upon each occasion ten days, and producing extreme debility. He, however, struggled through all difficulties, and after a time regained health. After this, he remained free from bruising or bleeding for twelve months, until one evening in 1870, when just before going to bed he cut a finger. The servant tied up the wound, and, fearing disgrace, put the child to bed without acquainting her mistress. Throughout the night the poor little fellow bled through dressing, bed and bedding, even on to the floor. In 1871, he bled once from a bite of the tongue; it was comparatively easily stopped. Altogether the boy is healthier, gains flesh, bears fatigue better, and bleeds seldom. He has been vaccinated, and had measles in a satisfactory manner. His joints have never been specially affected.

Edward first showed bruises when about a month old, and has had them from time to time ever since. At the same time as his brother (1869) he took scarlet fever. He got over the attack satisfactorily upon the whole, but has since then manifested the peculiar and characteristic symptom of hæmophilia—joint-swelling. This complication is excessively painful. It affects the larger joints, knees, and ankles, but shows no preference for either side. It resembles in many particulars an attack of bruising; and I incline to think that the symptomatic differences are to be explained by reference to the structures in which they occur; being fibrous rather than cellular, pain is increased, and serum rather than blood effused. He has bled externally upon three occasions, always from the tongue—(1) from the side, (2) from beneath, (3) from the dorsum. The last hæmorrhage happened in November 1871, and was very profuse, continuing fourteen days, producing great

prostration, and making the child as white as marble. He, too, has been vaccinated and has had measles.

George early manifested the tendency to bruise, but not quite to the same extent as his brothers. He, too, was seized with scarlet fever, and passed favourably through the primary disease. It left him weakly, and he became a prey to sequelæ. Among other drawbacks, a sub-maxillary gland inflamed, suppurated, and, although the abscess was left to open naturally, the internal surface of the sac exuded blood which, in spite of all attempts to restrain it, welled up through the fistulous opening. The child was cutting his teeth at the same time, and blood seemed to flow, as it were, from all parts of the gingival mucous membrane. He gradually sank, aged 16 months. For two days before death, the surface of the body was thickly covered with petechiæ, and one large ecchymosis presented itself over the left eye.

Gerald, an infant fifteen months old, is an average looking child, but has shown a marked tendency to bruise, beginning before he was ten days old. As yet he has not bled externally. He has cut five teeth.

The three girls are entirely free from this singular affection. They never bruise, and wounds and injuries heal readily. I have on two occasions extracted a molar tooth from the eldest, and experienced no trouble from subsequent bleeding.

Post mortem examinations have hitherto thrown no light upon the nature of the affection: nothing more than the usual appearances of death after hæmorrhage has been revealed; consequently its pathology is as yet but imperfectly made out. There is, however, a sufficient assemblage of facts to show that we have to deal with a condition different in many respects from what has hitherto been comprehended under the term "hæmorrhagic diathesis," and worthy of a name and place in our nomenclature of diseases. The hereditary character, the number of children in a family, the selection and limitation as to sex, the extent, painfulness, and frequent repetition of the sanguineous effusion, the peculiar affection of the joints, the (what for want of a better term must be called) eliminating character of the morbid process, and, lastly, the influence of drugs, collectively point to the diagnosis of a disorder unique, and to be distinguished from any of the affections known in our nosology, or described in our English text-books.

In the treatment of these abnormal developmental conditions, attention to hygiene becomes of the first importance. Healthy habitation and habit, suitable food and clothing, effect more than drugs. For these unfortunate children it becomes necessary, though hard, to forbid the more violent of boyhood's games. Whether the bleeding be subcutaneous or external, rest, mechanical and physiological, becomes essential. The treatment of the disease is at best unsatisfactory, but this is a matter which becomes robbed of much of its disappointment when one has observed the natural history of the complaint, and how its tendency is, after a certain time, after, as it were, a certain amount of blood has been drained off, always towards recovery. Most of the usual remedies in purpura and other hæmorrhagic diseases have failed in the treatment of my cases, thus furnishing an additional reason for believing the affection to be in its nature different from its apparent allies. For the bruises, contrary to custom, I avoid cold. Evaporating lotions and arnica do no good. Warm sedative fomentations and poultices alone give relief to pain. Even after the acute stage is over, stimulating embrocations avail little or nothing, for I have always observed that, if left alone, the effused blood rapidly disappears under food and exercise. The external bleedings in my cases have caused increased trouble and anxiety by occurring, for the most part, in the cavity of the mouth. The necessity for taking nourishment, the constant flow of saliva and the tendency to be ever cleaning the part with the tongue, render all dressing difficult and insufficient in this situation. From the mouth, too, much blood is swallowed, thus interfering with appetite, nauseating, and bringing on vomiting and diarrhoea. I have lost all faith in external styptics, none, in my hands, doing the least good. I have given a fair trial to solid nitrate of silver, copper, lead, alum, chloralum, perchloride and permanganate of iron, matico, ice, etc. Pressure when practicable is beneficial, but, owing to the weak coagulability of the blood, it must be maintained many days. Reasoning from the proved good effects of iron in hæmorrhagic and anæmic affections, we are tempted to resort to it with confidence in the treatment of ailments presenting these two marked symptoms; but, according to my experience, only to be disappointed. I have given the wine and tincture freely as a preventive and a curative, and during convalescence, but can speak of no results. I used to think that convalescence was hastened by the tonic, but later observation of the rapid restoration to health of cases left to themselves has shaken my confidence on this head. I have also given internally the mineral acids, gallic acid, lead, and alum, but have no praise to bestow. Turpentine is the only drug which has uniformly given satisfaction; and so much is this the case, that now whenever bruises are more than usual it is our constant practice to

resort to it. The mother beats up one drachm of the medicine together with the yolks of two eggs; and of this mixture one-sixth or one-eighth part is given two or three times a-day, until the system is brought under the influence of the remedy. This treatment may be undergone many times during the year; and I firmly believe that it has the power of warding off many bruises and much external bleeding.

Attention to diet becomes important in the management of these cases. Fresh meat, or a good extract thereof, pure milk, and eggs should be partaken of freely; ordinary vegetables in moderation; ripe fruit somewhat in excess. Among beverages, wine is useful during convalescence, and ale and porter as articles of diet. I confess a fondness for spruce beer, which probably contains some of the terebinthinate constituents of the fir, and thus combines in a pleasant form food and medicine.

In this short and necessarily imperfect history much has been omitted, and I have forbore to enlarge upon the trials and troubles which the constant attendance upon such cases entails upon doctor and parent. I have ventured to publish it, partly as a slight contribution to a hitherto overlooked subject, and partly for the sake of giving comfort and encouragement to any to whose lot it may fall to have to contend with the troublesome affection.

REMARKS ON THE PATHOLOGY AND TREATMENT OF SEA-SICKNESS.

By FREDERICK POLLARD, M.D.Lond.,
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THE frequency with which sea-sickness occurs, and its striking characters, have given rise to many speculations as to the essential cause of the affection.

Dr. Copland says, the primary effect of the motion of the vessel is to produce depression of the semilunar and allied ganglia, which results in vomiting. Dr. Chambers thinks that the principal cause of the sickness is the relaxation of the oesophageal sphincter by the vibration. The majority of writers, however, consider that the phenomena are mainly due to disorder of the central nervous system. Thus, Dr. Hooper, in his *Medical Dictionary*, says that sea-sickness seems to arise from a depressing effect on the brain, produced by the motion of the ship; and that the only remedy which is of any use is lying perfectly still with the head low, by which an increased quantity of blood is thrown on the brain.

The opposite view to this, viz., that increase of blood in the brain is the cause of sea-sickness, was ably supported in the interesting paper of Sir J. Alderson on this subject, which appeared in a recent number of the *BRITISH MEDICAL JOURNAL*. There is something at first sight very tempting in the ingenious analogy drawn between the blood in its vessels and the mercury in the tube of a barometer. A little consideration, however, will show that the illustration is not so accurate as it might, *prima facie*, appear to be.

The theory referred to is that, as the ship sinks in the water, the barometric tube falls more quickly than the mercury that it contains, so that the latter tends to impinge on the upper part of the tube; and it is argued that, in like manner, as the body descends, the blood falls less quickly than its containing vessels, and so tends to produce pressure on the brain; these successive impulses causing the vomiting. "When the rigid tube falls," says Sir J. Alderson, "the mercury, having its own inertia, and not being attached to, or a part of, the tube, remains stationary, at least for a time; thus the tube is pushed down upon or over the mercury." Now this might, perhaps, happen if the barometer were actually pushed down suddenly, because in that case the pressure would be applied to the tube, and not to the mercury, which would simply fall by its own weight. But in the case of a barometer merely allowed to fall, the glass and the mercury begin to move under the action of gravity at precisely the same moment; and so far from the mercury having a tendency to lag behind, its greater specific gravity tends to make it fall more quickly than the tube, the result being that it carries the tube down at a greater rate than that at which the latter would fall if it were empty. At sea, the falling of the ship is due to the action of gravity. There would be no tendency, therefore, for the mercury in the barometer or the blood in the body to commence falling later than the tubes which contain them. They would all begin to move at the same instant.

It is, nevertheless, a fact that the action of the waves does cause the mercury in an ordinary barometer to oscillate when the sea is rough. As already shown, the mere falling and rising of the ship would not account for this. It is the sudden striking of the ship by the waves

which in rough weather jerks the mercury up in the tube; and in order to reduce this to a minimum, certain ingenious modifications have been introduced in the construction of marine barometers; moreover, they are suspended from a ball and socket joint, so as always to maintain a vertical direction; otherwise, the mercury would become tilted with the various movements of the ship, and an erroneous impression that it rose and fell might be acquired.

Now, theoretically, we might imagine the blood as being jerked upwards against the brain by successive blows of the sea on the ship. But it is obvious that merely assuming the recumbent posture would not prevent this. There would be more probability in supposing that the brain itself might be jerked against the interior of the skull when the ship was violently struck; thus causing a series of small concussions, and adding something to the mental and bodily distress. But this will not explain the occurrence of sea-sickness in ordinary cases, when the ship rises and falls without violent concussions. For this an explanation other than a merely mechanical one must be found.

The most probable theory of sea-sickness is that held by Dr. Carpenter, Mr. Bain, and other writers, who consider that the mental and bodily prostration and the other symptoms arise from the continued action on the brain of a certain set of sensations, more particularly the sensation of want of support.

This feeling arising from the sudden loss of support, as when the footing or any prop that we lean upon suddenly gives way, is one of a most disagreeable kind. Should the accident have been perilous to life, as when the foot slips close to the edge of a precipice, or a rope cracks in Alpine climbing, a sickening feeling seizes the brain, the whole frame is agitated, and cold perspiration is felt all over.

The phenomena of sea-sickness appear to be due to the constant repetition of this feeling of loss of support, consequent on the pitching and rolling of the ship, more particularly the former. This explains the fact that the distress is most acute at the moment of the descent of the ship; whereas, when the part of the vessel in which the sufferer is placed rises beneath him, a comfortable sense of support is felt. It is well-known also that the distressing sensations may be to some extent warded off if a downward motion of the body be made at the time of ship's descent, and an upward motion when the vessel rises. In this way a kind of voluntary character is given to the sinking of the body, the nervous system is not taken so much unawares, so to speak, and thus the sensation of loss of support is less acutely felt. The feeling of want of support resides essentially in the muscular system; but the sensations of other senses contribute towards it. The sight of continually shifting lines and surfaces is an important factor; and on board steamer the constant vibration, the noise of the machinery, and evil smells of various kinds, are other items in the elements of causation.

That vision has something to do with the production of sea-sickness, is shown by the fact that closing the eyes will often keep off the sickness for a time; and in illustration of this point, we may refer to the general depression, faintness, and even nausea, which may be produced in susceptible persons by "doing" too many picture galleries in rapid succession, and this not dependent on the quality of the pictures themselves. That the vibration and noise may add to the general depression is shown by the painful effect produced on a person not used to it, by going into a large room of a cotton-factory, full of steam-looms at work. As regards smell, I can testify that going down into a hot cabin and sitting close to a reeking joint of boiled mutton, has nearly brought on sea-sickness, only warded off by a timely retreat into the upper air.

The constant unpleasant impressions, then, on all the senses, contribute something to the mental depression and the bodily disorder which constitute sea-sickness; though, no doubt, the main factor in its production is the continual feeling of want of support, suggested partly by the visual organs, but chiefly through the muscular system.

As regards treatment, since sea-sickness arises from certain impressions on the senses, the obvious indication is to render these sensations as feeble as possible. Application of the mind to an engrossing book will keep it off for a short period; and Dr. Chambers relates that his having to bind up a broken finger of one of the seamen relieved his own distress for the time. But the mind will speedily become alive to the sensations which force themselves on its attention. In order to lessen them as much as possible, the patient should preserve the recumbent posture, as near the centre of the ship as possible; he should lie on a thickly padded couch, so as to diminish the vibration. Fresh air should be admitted in order to remove bad smells. The eyes should be shaded, and as much noise as possible shut out. As regards drugs, the most rational suggestion is that of Dr. Döring, of Vienna, that a full dose of hydrate of chloral should be taken shortly before the vessel starts; and even in long voyages the repeated use of this medicine will ensure comfortable nights without the disagreeable after-effects of opium and chloroform.