Clinical Lecture

ON THE

THERAPEUTICS OF HEART DISEASE.

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[AFTER dealing with the nervous mechanism of the heart, and the relationship of the beats of that organ to varying degrees of arterial tension, the lecturer proceeded with the following remarks on cardiac therapeutics.]

In the treatment of most of the forms of cardiac disease rest in bed is more or less a necessity; and yet rest in the recumbent position has perhaps, in this country at least, been too much insisted upon, for excellent results have been obtained abroad by Oertel and others by means of Alpine climbing, graduated gymnastic exercises, and massage. The experience of physicians in this country who have given this method of treatment a trial is favourable, due care being taken as to the selection of cases. Where the walls of the heart are extremely feeble, we do well, in the first instance at least, to reduce the strain which is thrown upon them, and so we keep the patient quietly in bed for a few days that he may be carefully watched. Called urgently to a case of old-standing heart disease, with feeble pulse and difficult breathing, and with secondary lesions in lungs, liver, and kidneys, you would at once lose no time in administering such stimulants as brandy, ammonia, or ether; but where time is given for a careful line of treatment to be adopted, you would naturally direct your attention to a list of drugs whose efficacy in restoring disordered states of the heart and circulation is known to you either practically or theoretically. It is to this class of drugs that the term "cardiac tonics" has been applied—tonics in the sense that they act slowly and improve the contraction of muscular fibre, rendering in the case of the heart the beat of that organ slower and more powerful. Pushed beyond this limit, however, they frequently tend to bring about disordered and irregular cardiac movements; hence the necessity for care as to their employment, and watchfulness as to the effects produced by them. Whenever therefore the propelling power of the heart is failing, these are the drugs that are called for.

Now, everything which tends to keep the blood in the heart, or behind it in the veins, is simply so much obstruction placed in the way of the circulation. Obstruction at the aorta, or at any of the valvular orifices of the heart, is an impediment to the circulation, to overcome the effects of which the heart or some of its chambers must hypertrophy. Regurgitation through any of the cardiac orifices acts almost exactly in the same way. It is an obstruction, for it delays the circulation and tends to rob the arteries of blood. And the drug which has for us the greatest interest is *digitalis*. In aortic obstruction, hypertrophy of the left ventricle is generally present to such an extent that, the driving power of the heart being thus increased behind the obstruction, sufficient blood is squeezed through the constricted orifice during systole, so that no medicinal interference is, as a rule, called for. And the same remark applies to many cases of mitral stenosis—the hypertrophied left auricle is quite sufficient to fill the left ventricle with blood, owing to the contraction of the auricle taking place during the longer of the two periods of the cardiac cycle. It is the failure of a compensation that has already existed, or when compensation fails to be developed, that causes the subject with cardiac disease to come to us for advice. In many of these *digitalis* acts well; but as these are the cases in which a dilated right ventricle is sooner or later developed, and with this hepatic fulness and gastric catarrh, the drug has frequently to be discontinued on account of the sickness which is present. The cases, in my opinion, in which *digitalis* acts satisfactorily are those of mitral regurgitation where the lesion has not been too long in existence, where slight dilatation of the left ventricle is present. In these, owing to the improvement in the tone of the muscular walls of the ventricle,

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not only is there a larger quantity of blood sent forward into the system under a higher pressure, but by the drug increasing in addition the contractility of the circular muscular fibres which surround the mitral orifice, mitral regurgitation is itself diminished, a smaller quantity of blood is driven backwards towards the lungs, pulmonary congestion is lessened, and the pressure on the right side of the heart is diminished. It is in regard to the employment of *digitalis* in aortic regurgitation that the greatest difference of opinion prevails. Contrary to the opinion of many writers, I regard *digitalis* as of the greatest service in the treatment of aortic reflux. But there are cases and cases of aortic regurgitation. This is the form of cardiac disease in which, while there is often great effort on the part of the heart, very low arterial tension is nearly always present. I have seen a few cases of aortic regurgitation with high tension pulse, and they have always struck me as being not only the cases most likely to have the greatest longevity, but as being those in which fewest cardiac symptoms are complained of. A patient who has gone about for twenty years with aortic regurgitation, and with well-filled arteries and pulse of good tension, is in a very different condition from one whose arteries are seen pulsating visibly, whose pulse is of low tension, and whose countenance is pale. The former, even after the lapse of these many years, may require no treatment at all; the other may be practically beyond the influence of all drugs. Still, I must confess that I do not share in the opinion that the use of *digitalis* is dangerous in aortic regurgitation. In the early stages of an ordinary rheumatic endocarditis involving the aortic cusps, the diseased condition develops as a rule slowly, and consequently aortic regurgitation takes place only to the slightest extent. When the regurgitation increases, owing to further shrinking of the newly formed tissue in the valves, the heart, under the stimulating influence of the slightly increased distending force, undergoes hypertrophy, its beats become a little more frequent, and thus there is restored to the systemic circulation *in time* what was robbed from it *in quantity* by regurgitation through the aortic orifice. It is at this stage of the disease that most cardiographers consider only one tendency is developed, and that is in the direction of dilatation of the left ventricle. Owing to the reflux column of blood from the aorta passing into the left ventricle during diastole, and coming into contact with that which is passing forwards from the left auricle, the cavity of the ventricle is thus said to be increased; dilatation occurs, but this is kept within limits by the walls of the ventricle undergoing hypertrophy. As in aortic regurgitation the reflux column of blood is regarded as the dilating force, anything therefore which tends to prolong the period of regurgitation not only increases the tendency to syncope by lowering the arterial tension and robbing the capillaries of blood, but tends also to produce over-distension or dilatation of the left ventricle, and the cardiac muscle, thus unable to contract in the face of this over-distending force, remains in a state of flaccidity or paralysis, and death in such might be the immediate consequence. These are regarded as the dangers or risks that attend the administration of *digitalis* in aortic regurgitation—dangers that may be diminished by keeping the patient in the recumbent position. It has always struck me as being strange that if the upright or semi-upright position is the one in which the reflux column of blood through the aortic orifice exerts the greatest degree of pressure within the left ventricle—pressure spoken of as dangerous,—why is it that patients who are the subjects of this affection so unhesitatingly, and frequently contrary to our advice, assume this position? I do not believe in the dangers of this distending force in the early stages of aortic regurgitation from disease of the valves if the nutrition of the heart is maintained. There is a tendency to dilatation, but any attempt to make the distension permanent at this stage is met by increased contractility and hyperplasia of muscular fibre. Only a fortnight ago I made a post-mortem examination on a case of old-standing aortic regurgitation, and I found the walls of the left ventricle nearly an inch thick, whilst the cavity could not be said to be above the normal. Nor do I believe that by lengthening the period of diastole you allow greater reflux to take place into the left ventricle, and thus tend to the production of those dangerous conditions to which I have alluded. My experience of the treatment of aortic regurgitation is that here, just as in other forms of cardiac

disease, your patient is likely to do well the nearer you can bring the beats of his heart to the normal. The cases of long-standing aortic regurgitation—twenty years and upwards—that I have seen are those in which the pulse ratio is low, whether they have been taking medicine to keep it thus or not; and I know of a few cases at the present time where to my knowledge the disease has lasted from seven to ten years, and the pulse is frequently as low as 44 per minute, without there ever having been the least feeling of syncope—the patients following their handicraft the while. Instead of regarding the prolongation of the period of pause in the heart as dangerous, and giving time for the left ventricle to be over-distended, what occurs is this: Admitting that the number of beats of the heart has been reduced by digitalis, then such slowing is not only accompanied by improvement in the contraction of cardiac muscular fibre, but also by increased arterial tension, which means not only that the capillaries generally are better supplied with blood, but that the coronary arteries, too, are better supplied, and consequently that the heart is better nourished. But I also think that under these circumstances the regurgitation is itself lessened, and for this reason the aortic orifice is more or less constricted by the contraction of its own circular muscular fibres, or if not to any great extent by them, by the prolongation of that period which is spoken of by Foster as the third phase in the systole of the left ventricle. The contraction of the left ventricle still continues after all the blood has been ejected from it, and if this period is lengthened the orifice of the aorta still remains constricted, and the easy escape of blood backwards into the left ventricle from the aorta is prevented. While I cannot recall one case in which digitalis could be regarded as precipitating the fatal issue in aortic regurgitation, I can recall very many which have experienced the greatest benefit from it. The drug has frequently disagreed and aggravated at times existing gastric symptoms, but this applies to all cardiac remedies. Wherever I have had satisfactory results, they have always come along the line I have already mentioned—viz., slowing of the heart's beat, increase of arterial tension and improvement of cardiac nutrition. But aortic regurgitation is generally associated with mitral regurgitation, and as we have seen in dealing with mitral regurgitation the action of digitalis is to narrow that orifice and thereby diminish reflux through it, so in these combined cases the mitral ostium is also narrowed, and thus owing to lessened regurgitation through it, an additional factor is brought into operation, whereby the arterial tension is raised. In all cardiac cases it is the sudden assumption of the upright position which is dangerous, and not simply the fact that it has been assumed. The ill effects which I have seen follow the employment of digitalis have been more upon the stomach than the heart, but as digitalis is a drug which raises arterial tension by causing contraction of the peripheral arterioles, and thus throws additional weight upon the heart, I would not use it in cases where I suspected fatty heart or extreme dilatation of the left ventricle, nor would I consider its employment called for in any case of cardiac disease, no matter the lesion, in which arterial tension was already high.

In *convallaria* we have an excellent substitute for digitalis in the treatment of many cases of aortic regurgitation. My best results from this drug have been obtained in aortic regurgitation, and next to that in mitral stenosis. In cases of aortic combined with mitral regurgitation I have frequently found it relieve, and that very quickly too, urgent dyspnoea over which digitalis had no effect. I am inclined to think that it acts purely as a cardiac tonic—i.e., directly upon the heart, by improving the tone of its muscular fibre. It is not a drug that, as a rule, is badly borne or causes gastric irritation, but in one of my cases of advanced mitral regurgitation its administration was always followed by sickness and vomiting.

Of *casca* I have had no experience.

Belladonna I look upon as a valuable drug in the treatment of heart disease. Whilst it diminishes the sensibility of the endocardium to the varying pressure exerted by the distending column of blood on the walls of the heart, thus lessening the sense of fluttering and palpitation, it has induced easier and more forcible beats of the heart, partly by improving the tone of the organ, and probably too by its somewhat dilating effect upon the bloodvessels. In cases of mitral regurgitation its efficacy is most marked. Many of my best results have been obtained from belladonna in cases, chiefly mitral, where digitalis and other drugs caused violent

sickness. *Belladonna* in such not only gives relief to the difficulty of breathing, but relieves the gastric irritability as well.

From *caffeine* I have had good results, particularly in the treatment of mitral stenosis. I frequently combine it with *convallaria*, and have soon found arterial tension raised and diuresis increased. In only two of the several cases of mitral stenosis with dilated right ventricle in which I have employed it have I been obliged to discontinue it on account of sickness.

Through the kindness of Messrs. Christy of London I have had some experience of the beneficial effects of *Kola paste* in the treatment of heart disease. It is supplied in large irregular masses of a brown colour, not unlike chocolate, and is a paste into which the juice and substance of the *Kola* nut largely enter. Its efficacy as a nervine tonic has long been recognised in those places where the fruit abounds. By the inhabitants of such it is employed as an antidote to alcohol: men who are so intoxicated and rendered incapable of walking straight are said to become sober and recover their normal gait from within half an hour to an hour after taking the drug. To patients who are the subjects of heart disease I often give as a beverage for breakfast two drachms of the *Kola* paste mixed well with boiling water, sweetened with sugar, and either flavoured or not with vanilla; and from a repetition of this night and morning not only has there been increased diuresis (a fact explained by the 2 per cent. of caffeine which it contains), but good has also come from its action as a cardiac tonic and nutritive. Cases of mitral regurgitation have received much benefit from it, and some of my patients, the subjects of aortic regurgitation, have received so much good from it that they ask for its continuance, telling me at the same time that whilst taking it they pass a larger quantity of urine, and feel generally more comfortable. Dropsy I have seen disappear under its use. In the treatment of the headache complained of occasionally by patients the subjects of cardiac disease consequent upon contracted kidney and diseased arteries, I have had satisfactory results from its use.

Next to digitalis—nay in many respects superior to it, I rank *strophanthus* as a cardiac tonic. *Strophanthus* is one of the most powerful cardiac tonics we possess. A few doses of the tincture are in many cases sufficient to produce in patients who are the subjects of aortic or mitral regurgitation a feeling of well-being and comfort, followed by complete relief to difficulty of breathing. In functional cardiac irregularity its effects are quick and lasting, while in many cases of advanced mitral regurgitation the difficulty of breathing is soon relieved, the pulse improved, and the quantity of urine increased. Similar results have been obtained in the treatment of aortic regurgitation. Patients unhesitatingly speak of the relief which is given to any præcordial pain that is present, of diminution of, or relief to, the numbness felt running down the left arm, of relief to dyspnoea, and of it creating a feeling of general well-being consequent upon the improved state of their circulation. Through the kindness of Messrs. Brady and Martin, of Newcastle-on-Tyne, I have tested the therapeutical values of ethereal tinctures made from the pericarp, hairs, and seeds of the plant. From the tincture made from the pericarp no decisive results were obtained, although one patient, the subject of aortic regurgitation who could not take *convallaria* without feeling sick, said that when the dose was pushed it relieved præcordial pain. It did not increase the amount of urine passed. The tincture made from the hairs—which in colour is not unlike that made from the seeds, a beautiful green—answered well. Its efficacy is less marked than that made from the seeds. It is not nearly such a strong diuretic. From my experience of the tincture made from the seeds, I regard *strophanthus* as a powerful cardiac drug; it acts quickly and strongly upon cardiac muscular fibre in small doses, but in large doses it is a cardiac irritant and muscular poison. Whatever improvement follows its administration is, I am convinced, from its special action upon the heart; more forcible contraction of that organ is induced, the general arterial tension is thereby raised, and diuresis is promoted. Old-standing cases of mitral regurgitation, with small feeble pulse, cold extremities, distended jugulars, and pulsating liver, have improved under its use; and yet, while this is the case, it is only right to mention that in not a few patients most unpleasant symptoms have been developed, such as sickness and vomiting, pain in the stomach, and diarrhoea—symptoms which,

while they have in many disappeared on reducing the dose of the drug, have in others only yielded on withdrawing the drug altogether. Its taste is somewhat objectionable, being extremely bitter. Three minims of the ordinary ethereal tincture is quite a sufficient, and to many rather a large, dose. As an illustration of the good effects of strophanthus I would point to the subjoined sphygmograms. (See Figs. 1 and 2.) In this case the effect of the drug was most

FIG. 1.

Deeply cyanosed; pulse feeble and rapid; ineffectual systole; mitral regurgitation; dilated left ventricle. Taken before treatment, when mitral murmur was not very audible.

FIG. 2.

One week after taking strophanthus: much improved; pulse stronger and firmer; less ineffectual systole; mitral systolic murmur much more audible.

marked, and the case is typically one of those in which its influence is soon felt by the patient. Here, in addition to the mitral regurgitation and dilated left ventricle, there was much cardiac distress, shortness of breath, and ineffectual systole; several of the pulses failed to reach the wrist. A few doses sufficed to dispel the unpleasant cardiac symptoms, and restored the radial pulse to a very great extent. In cases, too, of functional cardiac derangement, palpitation, sense of fluttering, and enfeebled cardiac action, strophanthus has, in small doses combined with stimulants, answered well.

In *sulphate of sparteine* we have a drug (dose one to three grains) of whose beneficial effects as a cardiac tonic I can speak highly. Probably its action as such is indirect. In one of my cases of aortic and mitral regurgitation ascites developed, due perhaps to some subacutely inflamed condition of the peritoneum as much as to the state of the heart. The distension of the abdomen was so great that the breathing became much impeded by interference with the descent of the diaphragm. The action of the heart was much embarrassed. The patient was very ill. His pulse was soft water-hammer, and 110 to the minute. A few days after the administration of sparteine the distension of the abdomen was considerably less. The pulse was of much firmer tension, and had fallen to 68, and the breathing had become easy. From the sphygmograms (see Figs. 3, 4, and 5)

FIG. 3.

Sphygmogram taken when first under treatment for aortic and mitral regurgitation. Pulse of low tension.

FIG. 4.

Taken on readmission six months after the above, when the abdomen was filled with fluid, and there was oedema of feet, with pulse extremely rapid and of low tension. Tracing taken before treatment.

FIG. 5.

Taken a few days after the preceding, when he had received considerable benefit from sparteine and digitalis; ascites disappearing; large quantities of urine being passed. Pulse had fallen from 110 to 68 beats per minute; tension much increased coincident with improvement in health. No albumen in urine.

it will be observed that the tension had considerably risen, and that it bears some resemblance to the tracing taken in Bright's disease. Corresponding with the rise in the arterial tension and that of feeling generally better, the amount of urine passed rose from twenty to ninety ounces daily, and in less than a fortnight not only had the whole of the ascites disappeared, but the ordinary cardiac symptoms depending upon the aortic regurgitation had also ceased to trouble him; this, be it remembered, at a time when his pulse was only 68 per minute, the half of what it was on admission, when the period of cardiac diastole was so lengthened that in accordance with the usually accepted opinion the effect of aortic regurgitation should have been at its worst. In this condition, and with a pulse of high tension, the patient left the infirmary feeling quite well, and returned to his work as a machinist in the Elswick works. I have seen him since from time to time within the last few months, and he tells me that he has felt better since this last illness than he has done for the last six years, the date to which he ascribes the origin of his cardiac affection. His case is not only an illustration of the absence of danger in producing lengthening of the cardiac diastole, but is also a striking one of the good effect which is produced upon the heart and thus, upon the system in general, by slowing the pulse and raising at the same time arterial pressure. Another thing which was noticed in this case was that, while the aortic diastolic murmur was quite easily heard and recognisable before the treatment was commenced, its audibility was much increased—a fact which, while it points to an increase in the force which drove the blood backwards as it had done forwards, may also have been due to increased constriction of the aortic orifice—either stronger contraction of the circular muscular fibres at its orifice, or prolongation of the third phase in the systole of the left ventricle. Sparteine has always seemed to me to act very much in the same way as digitalis—i.e., by causing contraction of the peripheral arterioles. Arterial pressure is thus raised, the coronary arteries are better flushed, cardiac nutrition is improved, and the left ventricle thereby responds with greater vigour and force to the stimulus of distension created by the column of blood within it. Other dropsical effusions quite irrespective of heart disease—e.g., ascites from cirrhosis of the liver, pleural effusions—have disappeared under its use, and in any case of dropsy where the pulse is small and compressible I should regard sparteine as a drug extremely likely to do good.

Barium chloride, I find, raises arterial tension and thus acts as a diuretic. With half-grain doses morning and evening, several of my cases of aortic regurgitation have had their pulse ratio reduced, the pulse rendered fuller and firmer, and the amount of urine increased. Its action as a cardiac tonic is indirect.

Venesection has fallen too much into disuse. In several of my cases, both of aortic and mitral regurgitation, I have not only succeeded in warding off impending death, but by removing blood from the veins have placed the patient in the enjoyment of good health for months to come, repeating from time to time as necessity arose subtraction of blood from the arm. In cases of over-distension of the right ventricle, where the jugular veins are swollen, the face livid, the pulse small, and dyspnoea urgent, I have never hesitated to remove from eight to twelve ounces of blood from the vein in the arm, or failing this from any very distended vein at a reasonable distance from the heart, with, in most cases, almost immediate relief to the breathing, improvement of the pulse, and with increased comfort to the patient. The removal of blood relieves the over-distended right ventricle, wards off the paralytic condition into which its walls are being thrown as the result of over-

distension, and, by allowing the muscular fibres to contract upon diminished contents, life has been saved. The use of stimulants at this time must never be forgotten.

And if venesection as an old remedy is not nowadays sufficiently practised, the same remark applies to the administration of *mercury*. Neither in recent endocarditis, nor in the treatment of the conditions leading up to it, is mercury ever called for; but in cases of old-standing mitral disease, where the venous system generally is engorged, the liver enlarged, and its venous channels over-distended, the employment of pil. hydrarg. c. coloc., in two to four grain doses at bedtime or for a few days at first night and morning, with or without the addition of squill, will be often followed by the happiest results. It will in almost every case form a useful adjunct to any line of treatment which is adopted. Calomel is again being resorted to as a remedy in cardiac dropsy.

In the treatment of angina pectoris nothing has answered so well as the inhalation of a drop or two of *nitrite of amyl*, but in many cases of aortic regurgitation attended by constant and very severe præcordial pain, with paroxysmal exacerbations, I have had the most satisfactory results from the internal administration of nitrite of amyl, beginning with two minims, and increasing it to ten, fifteen, or twenty minims, combined with ten minims of tincture of opium and twenty minims of sal volatile.¹

In the treatment of the insomnia of heart disease we have two reliable and safe drugs that we can fall back upon. *Paraldehyde*, in doses of from fifteen to thirty grains, answers well. The sleep is similar to that induced by chloral, but, unlike this drug, it does not depress the action of the heart. I have not found it act as a diuretic, as some assert. The only and a most important drawback to it is its very unpleasant taste. Patients simply refuse to take it after a few trials. Not so with *urethan*, which I have found, in doses of ten grains and upwards, to be one of the safest hypnotics in cardiac disease. It is in heart disease that we frequently see patients thoroughly worn out for want of sleep. Nay, they are even afraid to sleep, for no sooner has sleep been induced than, the cyanosis increasing, they suddenly wake up and gasp for breath. Opium and its allies are most unsafe hypnotics where there is such a carbonised state of the blood; they only add to the accumulation of waste products in the blood. Chloral, too, cannot be given without running the risk of inducing cardiac failure. It is in such cases that urethan acts well, and is perfectly safe. It is less unpleasant than paraldehyde; in fact, if there is any marked unpleasant taste with the drug, the probability is that it is of English and not of German make. I have seen a patient, the subject of heart disease, who had not slept for several days, fall into a calm and placid sleep after a few grains of urethan, waken from it calmly four or five hours after without any dyspnoea, and express himself as feeling quite a new man to what he had been a few hours previously. After this the whole character of the case has been changed, and patients who until then had been retrogressing not only began to improve, but ultimately made a good and fairly lasting recovery.

¹ It is only of late that I have had experience of the value of the nitrites in the treatment of mitral stenosis. Dr. Barr, in the *Liverpool Med. Chir. Journal* for July, 1886, draws attention not only to the inefficacy of digitalis, but to the harmfulness of the drug in mitral stenosis. In such cases, while the systemic arteries are under-filled, the vessels of the lung are over-filled, as are also the left auricle and the chambers of the right side of the heart. The left ventricle, compared with these, is practically empty. What is wanted is an increase of force in the right ventricle and a reduction of the contents of the pulmonary vessels. No cardiac tonic will produce this alone without acting upon the left ventricle. If you increase the capacity of the arterial system, relief may come to the over-distended lungs and the veins generally. In one case of mitral stenosis with hæmoptysis, urgent dyspnoea, dilated right heart, and small feeble pulse, the relief given generally by nitrite of amyl was most marked.

EFFECT OF RESPIRATION AND DEGLUTITION ON THE VENOUS HUM.

By GEORGE R. MURRAY, B.A. CANTAB.

THE venous hum, as heard in the large veins of the neck, is a murmur which gave rise to much discussion as to its situation when Bouillaud first drew attention to it. He named it "bruit de diable," and considered that it was an arterial murmur, an opinion which was also held by other French writers. It was first shown to be a venous murmur by Dr. Ogier Ward in this country. This murmur has been found to be of little practical value in diagnosis, and consequently attracts much less attention now than it did formerly.

The venous hum is most distinctly heard on auscultation over the lower end of the right internal jugular vein, in the neck of a patient suffering from anæmia; and when studied in this situation it illustrates some points which are perhaps of physiological rather than medical interest. As it occurs in a vein just outside the thorax, this murmur is exposed to influences which cannot be brought to bear on intra-thoracic murmurs. Thus we find marked changes in the venous hum are brought about by respiration and deglutition. Before proceeding to the consideration of these changes, it is necessary to review briefly the conditions which produce the venous hum.

The internal jugular vein is slightly dilated at its lower end into a kind of sinus, which is so attached by the cervical fascia to the surrounding structures that it cannot shrink. When the volume of the blood is diminished in anæmia the upper part of the vein shrinks, but its lower part retains its former size. The blood flowing from the narrowed vein above into the relatively dilated part below sets up a fluid vein, and as the blood contains fewer red corpuscles than it does normally, it is the more readily thrown into vibrations. It is now generally supposed that the vibrations of the fluid vein produce the murmur, and in some cases a fine thrill can be felt. It is important to bear in mind that the loudness of a murmur so produced varies with the rate of the flow. The faster the flow the louder the murmur, and conversely slowing of the flow diminishes or stops the murmur. Changes in the rate of the blood-flow in the vein may be brought about by variations in either internal or external pressure. The former is illustrated by respiration, and from some observations which I have made, the latter appears to be illustrated by deglutition.

With regard to respiration.—In some cases slight variations in the venous hum can be heard during normal breathing, the murmur being louder during inspiration than during expiration. If, however, the patient makes an inspiratory effort with the mouth and nose closed, a distinct increase in the loudness of the murmur can be heard; and conversely a slight expiratory effort, made in the same way, stops the murmur. These facts are practical illustrations of the two effects of respiration on the blood-flow in the veins towards the heart: first, the increase in the rate of the blood-flow, due to the diminished intra-thoracic pressure during inspiration; second, the slowing of the blood-flow during expiration, caused by the rise of intra-thoracic pressure. The effects are much better brought out when the entrance or exit of the air is prevented, as then the whole force of the inspiratory or expiratory muscles brought into play is expended in aiding or retarding the flow of blood into the thorax.

With regard to deglutition.—I find that during the act of swallowing the venous hum in the internal jugular vein ceases. This is a fact to which I believe attention has not before been drawn. It is most conveniently observed in the following manner:—Place the patient in the erect posture, with the head slightly turned to the left, and apply the stethoscope over the lower end of the right internal jugular vein, just above the clavicle. Then get the patient to swallow a mouthful of water. The venous hum which was previously heard ceases during the act of deglutition, and can be heard to recommence as soon as it is over. A possible explanation, and one that seems to me to be probable, is that this cessation of the venous hum is brought about by external pressure, exerted by the omo-hyoid muscle on the internal jugular vein during deglutition. The possibility of compression of the internal jugular vein by the omo-hyoid muscle was suggested by Theile. A consideration of the anatomical relations of the omo-hyoid muscle and the internal jugular vein, and of the action of

A NEW HOSPITAL AT ZANZIBAR.—According to the *Bombay Gazette*, Mr. Tharia Topun made an offer to the British Government, on the day of the celebration in Bombay of Her Majesty's Jubilee in February last, to build and endow a hospital at Zanzibar. The estimated cost of building the hospital will be about 80,000 rupees, and Mr. Tharia Topun has offered a further sum of 150,000 rupees for maintaining the institution on a permanent basis, which amount the British Government will hold in trust for the donor. The institution will be named the Tharia Topun Hospital. The offer has been accepted by Lord Salisbury, as Foreign Minister, on behalf of Her Majesty's Government.