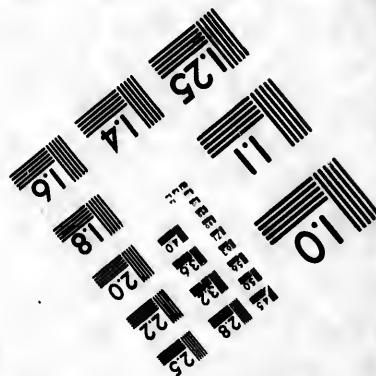
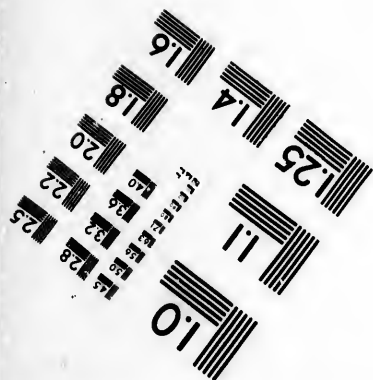
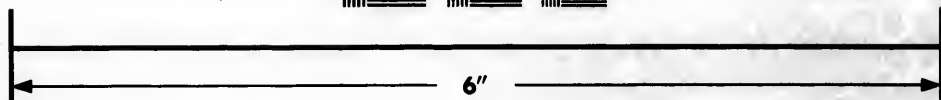
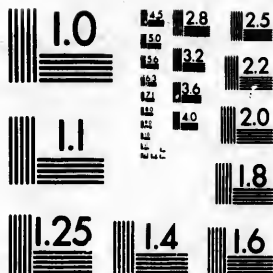


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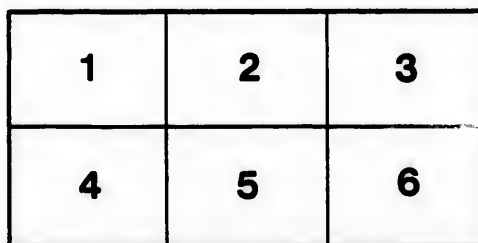
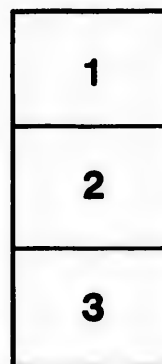
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THE PRESENT STATE OF CARDIAC THERAPEUTICS.*

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The subject of cardiac therapeutics is one of great importance—of much more importance than is generally conceded to it by the ordinary text-books. During the past year or two quite a revolution has come over our ways of looking into the future physical life of patients suffering from many of the forms of organic heart disease. In fact, as yet, these views to which I refer have not by any means become general. These changes of opinion are of such paramount importance to the well-being and happiness of those committed to our care, that it is the bounden duty of every practitioner to study them seriously. The changes to which I refer consist in the much more favorable prognosis that is admissible in the great majority of cases.

Last year, at the meeting of the British Medical Association at Brighton, Sir Andrew Clarke created what might almost be called a sensation by giving the life history of a very large number of cases of organic disease of the heart which he had the opportunity of observing for very many years. The point made by Sir Andrew was this: that patients with organic heart disease lived much longer than they were supposed to do, and that the great majority of them were not only able to live, but also to work—to live with comfort and work with vigor.

No doubt a number of observers had pointed out before that cases of organic disease of the heart do frequently present them-

* The Address on Therapeutics at the Twentieth Annual Meeting of the Canadian Medical Association, Hamilton, Sept. 1, 1887.

selves where the lesion had been in existence during a long lifetime without the patient's knowledge that there was anything seriously wrong. There is an important therapeutic lesson to be gathered from the history of a case of a man with one or more seriously damaged heart valves, who has lead a long and active life, throughout which he has been unconscious of anything wrong. Such a case teaches us the clinical history of the course of the disease uninfluenced by treatment and uninfluenced by the mental worry necessarily present where there is a consciousness of the presence of a grave organic lesion.

In dealing with this subject, I will first refer to the means that should be employed when we have to do with an acute inflammatory process in the endocardium, and (2) the treatment of the consequences that result from any chronic condition or state that gives rise to secondary changes (mechanical) in the heart; or, in other words, the treatment of threatened or actual loss of compensation.

Given a case of acute endocardial inflammation of, say, the aortic valves, which leads to deformity and, consequently, to incompetency of these valves, what are we to do to limit the extent and, consequently, the hurtfulness of such a lesion? What, in other words, can be done to prevent the connective tissue formation assuming a great degree?

There is one great principle in the treatment of inflammatory affections which we must endeavor to carry out here, and that is

REST.

Rest to the inflamed valves. Complete rest is, of course, impossible, but relative rest is to some extent obtainable. By giving the valves less to do we in a measure limit the extent and degree of the inflammatory process going on in them. The lower the blood pressure is, the less work will the valves have to do. The treatment, then, consists, in those measures which lower or depress the blood pressure. The first important point to attend to is absolute rest in bed. It is not necessary to insist on the importance of this—it is self-evident. We, however, may have a high blood pressure in spite of bodily quiet. The

amount of fluid taken in should be limited, for it is a well recognized physiological fact that a *dry diet* is the most efficient means of lowering blood pressure. This has been conclusively proved by Kussmaul and Tenner's experiments. Of drugs, we have a number that markedly lower the blood-pressure, prominent among which are chloral and the nitrites. The judicious use of chloral in cases of endocarditis is, according to Fothergill, a very efficient way of limiting the sclerotic process. In the nature of things it is impossible to estimate the value of this treatment in any individual case. It can only be expected that at best we can limit the diseased process, and to what extent this is accomplished in any case it is impossible to tell. No doubt blood-letting is a powerful way of lowering the blood-pressure, but its action is very temporary, and therefore not nearly so efficient as a strict adherence to a dry diet. On physiological grounds I should judge that the employment of frequent blistering over the cardiac region is injurious. At best, the action of blisters on the inflammatory process is very doubtful, and we know that such strong irritation of the skin does, reflexly, tend to keep up a high blood-pressure. The trifling amount of serum drained from the tissues may be eliminated.

THE TREATMENT OF CARDIAC DISEASE DURING THE PERIOD OF COMPENSATION.

When from any cause we have an obstruction to the outflow of blood from the heart, there is a damming up of the blood in the lesser circulation, which soon leads to changes in the vessels and in the heart itself. The changes in the vessels are obviated for the most part by the secondary compensatory changes in the heart. Compensation can never be perfect, still it is so perfect frequently that the patient is quite unconscious for many years of any circulatory disturbance or trouble whatever. We may say that practically we do meet with perfect compensation. As long as the heart is able to overcome the mechanical obstructions heaped up by disease, then so long will the patient remain well. In other words, while compensation is good all is well.

The treatment is now directed to the maintenance of this com-

pensation. Sooner or later in many cases it shows signs of failing, the earliest indication being usually shortness of breath. What can we do to prevent compensation from failing, and when it threatens or has actually set in, what measures should we employ? The answers to these questions are all important.

Given a case of acute rheumatism, where there develops during its course an acute aortic valvulitis, with subsequent sufficient compensation to enable the patient to attend to the ordinary duties of life, what advice are we to give? How should the patient live in order that he may keep up his cardiac compensation?

There are certain general therapeutic principles which it is important to bear in mind in all cases, no matter what the cause of the circulatory disturbance is. The first is the strengthening of the heart-muscle. It is important to remember that the heart is a muscle, and that its strength is increased by all those influences which increase other muscles. The usual advice given to patients affected with heart disease is to rest as much as possible so as to leave but as little work as possible for the heart to do. Recently Oertel of Munich has practised an entirely different method of dealing with these cases. His method of treating these cases is just now, in Germany, attracting very marked attention, and are very favorably received. Leyden, at the late meeting of the Society of Physicians, considered Oertel's treatment as a distinct advance, and as involving a distinct therapeutic principle. I will endeavor, briefly, to lay before you Oertel's method of keeping up compensation or of averting its loss when thus threatened. He maintains that exercise is the means we have of strengthening the heart muscle. He advises walking—at first on the level ground and afterwards hill climbing. He counsels his patients to take as much exercise as possible. The patient should walk until violent palpitation is brought on, and then he is required to stand still till it has abated, and until the shortness of breath is satisfied by voluntary, long, deep inspirations. He keeps not only patients with sufficient compensation, but those with insufficient compensation, at this exercise, and repeats it after longer or shorter intervals of time, according to necessity.

A second condition that he lays stress on is the keeping up of a good state of nutrition by a diet rich in albumen, so that the tissues during work may be replaced, and that sufficient material may be furnished for the formation of new tissue elements, especially for the muscular hypertrophy. The food, then, should be one especially rich in nitrogenous elements—a meat diet in the main, the fat and carbohydrates being only allowed in limited quantities.

Oertel further strongly insists on the regulation of the amount of fluid. When there is excess of fluid, then we are apt to have blood stasis with all its consequences; the veins become over-filled and the arteries less full. The deleterious influence of this stasis is especially noticeable in the heart itself from over-filling of the coronary veins, the heart-muscle in consequence directly suffering. If there is an excess of fluid in the body already, then it should be got rid of. The skin should be made to act freely, and one of the best means we have for this purpose is exercise. It is only when diaphoresis is not obtainable by exercise that we should resort to other measures, as hot-air baths, Turkish baths, and pilocarpine. The importance of regulating the body fluid is at once apparent when we remember that the venous system is always over-full; no matter how perfect a compensation may be, it is never sufficient to maintain the normal relations between the arterial and venous systems. Oertel lays great stress on the importance of preventing fat formation, especially in cases after the restoration of a previous loss of compensation. Owing to the incomplete filling of the arteries and the over-fullness of the veins there is of necessity incomplete oxidation, which leads to the deposition of fat. This is especially marked in those who are prone to put on fat and those who partake freely of carbohydrates. The heart suffers directly as well as indirectly. Owing to the coronary arteries being insufficiently filled, and owing to the lack of oxygen, the heart fails to perform its work efficiently, and in consequence we have fatty degeneration of its fibres in addition to fatty deposition on its surface and fatty intermuscular infiltration. This further enfeebles its action. It follows, therefore, that we should constantly guard against all

those influences which tend to bring about this enfeebling power. The combustion of fat already in the body must be promoted, and the supply of fat and carbohydrates in the food must be as small as possible.

Now the means best adapted to promote the combustion of fat are those which I have already alluded to for strengthening the heart-muscles and regulating the quantity of fluid in the body. In addition to ordinary exercise, Oertel recommends the undertaking two or three times a year of mountain tours. This difficult exercise, with the increased sweating attending on it, the diminution of the fluid supply and the use of a more albuminous diet will soon reduce any fat which has accumulated. The increased vigor in consequence given to the heart and the removal of obstruction to its work will soon show itself in the restoration of compensation, and by careful living afterwards, according to the plan sketched, it is possible, so it is claimed, for a patient to maintain his original state (dating from the early compensation) for very many years.

Such, in brief, is the method proposed and successfully practised by Oertel in the management of the retention of compensation and its restoration when lost. I freely admit that I have given but a very imperfect outline of it. The subject is one of such importance that to do it full justice it would require a treatise. Great credit is due to Oertel for the elaborate, scientific, and very painstaking manner in which he has worked out this whole subject. In his work he gives the history of a case that he carefully treated and closely observed for nine years.

Many years ago, Stokes of Dublin recommended a somewhat similar treatment, but in spite of his great advocacy it fell into disuse, even if it was ever practised to any extent.

At the recent meeting of German physicians a paper was read by Franz with the title of "*Rest or Work in Heart Disease.*" From an extensive experience he has come to the conclusion that in chronic cases active but careful exercise is conducive to the strengthening and slowing of the heart's action. He pointed out how damaging it is to the circulation to have a dilated heart beating quickly and incompletely. The stretched ventricle is

never completely empty, so that finally it loses its elasticity, and owing to its almost constant working it soon degenerates. Now here, if we bring about a complete emptying, we give the ventricle rest and in consequence strength. Franz claims that this can be completely and efficiently effected by exercise—more completely and efficiently than by any other known means. We have, he says, in exercise a means more powerful and safer than digitalis. He further claims that the improvement is more lasting than that effected by other means—that the work of the heart is lessened by the disappearance of the stasis in the venous system, and the nutrition of the heart is vastly improved through the deeper inspirations making the blood richer in oxygen. He advises that in cases where there is good compensation already, that in order to maintain it ordinary gymnastics are sufficient. He lays great stress, however, on the possibility, even probability of this being overdone, and he insists that every exertion should be followed by a period of rest. Where compensation is, however, lost, the greatest care must be exercised before beginning active exercise; the nature and the amount should be strictly laid down. Before beginning mountain climbing, baths, with a course of Swedish gymnastics, are advisable.

Franz believes that there is no danger whatever in patients with heart disease exercising so long as the palpitation induced by this work is quickly relieved by taking forced deep inspirations. The deep inspirations diminishes quickly the increased tension that is brought about in the pulmonary vessels.

Schott of Nauheim, who took part in the discussion which followed Franz's paper, contended that mountain climbing was only useful in a small number of cases, and that he had seen much harm follow its practise. He, however, strongly approves of exercise in a gentle way for the heart muscle. He therefore, although opposed to the extreme views of Oertel, is satisfied that much good can be effected in those cases with exercise when practised judiciously. Both he and Franz have seen a number of cases where mountain climbing has done irreparable damage to the already overtaxed heart when practised by the patients without first consulting a physician.

It will be seen that we have the evidence of several competent authorities that in exercise we have a ready and all-powerful means of effecting good when used properly, but an agent powerful for evil when injudiciously employed. Time alone will enable us, however, to determine to what extent we can rely on this method of obviating the effects of a damaged compensation. It is a subject of deep and far-reaching importance, and will require time, patience, and sound physiological knowledge to determine when it should be recommended or whether it should be recommended at all or not.

It is no doubt more adapted for cases of commencing fatty heart and for cases of threatened heart failure from deformity of the chest or disease of the lungs. That it is applicable for cases of threatened heart failure, no matter what the cause may be, is contended for by its great promoter—Oertel. It will make us all think a little more in the future when we are face to face with the question. Exercise or Rest, which is it to be?

There is a time in cases of loss of compensation that exercise is no longer possible, and where we have to resort to medicinal agents. Of all these agents, none, on the whole, is comparable to digitalis. The usefulness of digitalis in cases of heart failure is great indeed. I would not occupy the time of this Association in entering into any details as to its mode of action and employment were not I firmly convinced that there is a very imperfect knowledge among many practitioners of how and when digitalis should be used. How universal is the practice to give this agent when a cardiac lesion is diagnosed without any reference to the nature and attending consequences of such a lesion. The great use of digitalis is in cases where there is commencing or even very advanced loss of compensation. When compensation fails we have stasis, as evidenced by breathlessness, quickened pulse, œdema of the ankles, diminished secretion of urine. The first marked effect of heart failure is diminution in the aortic pressure, as shown in the diminution in the amount of urine excreted.

The essential therapeutic action of digitalis consists in its power of raising the blood-pressure. The slowing of the pulse,

upon which so much stress is laid, is, according to Schmiedeberg, a result of the high pressure. The results and symptoms of loss of compensation in cardiac disease are mainly, as I have said, due to deficiency of blood in the arterial vessels and to a too low a pressure in them. If the blood pressure be raised, the secretion of urine increases, the effused fluids are absorbed from the cavities and tissues of the body, and the respiratory distress disappears. So long as digitalis causes an increase in the quantity of urine, so long is it safe to proceed with its administration. We know that digitalis has no influence in increasing the quantity of urine in health or in disease where the blood pressure is high. Its diuretic action is entirely dependent on its power of raising an abnormally low blood pressure. In order to bring about the diuretic effect of digitalis it is necessary to give it in full doses. The effect of small or even moderate doses is to increase the general pressure, including the pressure in the arterioles of the kidneys. While the pressure throughout is high, there is no diuretic action manifest. After a certain quantity has been administered, the increased pressure in the kidneys gives way, with the result of a rapid and often great increase in the quantity of urine. The increased diuresis may continue several days. If the drug is still continued, there is general fall in the blood pressure, and in consequence the diuretic action soon ceases. When the urine, after being increased in quantity by digitalis, considerably diminishes, then the drug should be at once withdrawn. This decrease is a warning which should never be neglected. If it is, the ventricular contractions become weaker and weaker, until finally we only hear a "toneless tic-tac." When this stage is reached, it requires but little more digitalis to bring about a stand-still of the heart in contraction. Up to the production of decrease in the quantity of urine, nothing but good is observable.

Now as to the quantity of digitalis necessary to bring about diuresis there is great variation. Different persons vary greatly as to their susceptibility to its action. Forty minims of the tincture four times daily for three days will in the great majority of cases bring about this diminution. Sometimes it is necessary to

give as much as half an ounce daily in divided doses before the result is attained. Cases of dangerous heart failure should always be treated according to the method sketched. It is very unscientific to expect the best results from any other way. No doubt 10 or 15 minims of the tincture several times daily will to some extent relieve an overtaxed ventricle; even rest in bed without any medication will at times prolong life; but the best results are only obtainable when absolute rest in bed is combined with digitalis in full doses.

There is a large group of agents which belong to the digitalin group which have lately attracted a great deal of attention. There is Scillain, which is the active principle of squills; Helleborein, which occurs in the various species of hellebore; Oleandrin, found in conjunction with digitalin in the common oleander; there is Apocynin, contained in Canadian hemp; Adonidin, found in the spring adonis; Convallamarin, in the lily of the valley; and lastly, Strophantin. Now all these agents possess in common the property of slowing the heart and increasing the blood pressure. Squills has been used empirically for a long time as a diuretic and heart tonic. It enters into the composition of the still famous Baly pill, the other ingredients being digitalis and mercury. This is a remarkable combination, built entirely on empiricism long before the science of pharmacology was even dreamt of. We have here a combination containing two heart tonics, digitalis and squills, and a direct diuretic, mercury. It is only a very recent discovery that mercurials, especially calomel, have a direct diuretic action. It is a proof, if one were needed, how foolish it is to neglect the laborious acquired knowledge of our forefathers, call it empiricism if we like. Of the other agents mentioned, only strophantin and adonidin need be referred to; the remainder we know little or nothing outside of the laboratory.

Strophantin, introduced by Professor Fraser of Edinburgh, has now been in use about two years, and although all the reports are not confirmatory of a very marked tonic action, still we have sufficient evidence to enable us to say that it is a very valuable addition to the list of cardiac tonics. It has been found well

adapted for cases of cardiac failure depending on valvular disease. Pins of Vienna, who has given us a report of its action, claims a high place for it, even suggesting the probability of its displacing digitalis. He found the weak, rapid and irregular pulse of mitral disease become slow and powerful. It acted as a prompt diuretic, being quicker in its action than digitalis. It is worthy of a thorough test, but, as yet, we are not sufficiently acquainted with its mode of action to determine the exact place it will hold in cardiac therapeutics.

A few cases have been reported where adonidine has had a very marked action in toning up a failing heart, even when digitalis is alleged to have failed; but in all the reports that I have examined, the digitalis was not administered with that freedom that is necessary in order to obtain its full effects. Still there is sufficient evidence to prove that in adonidine we have a very powerful cardiac tonic and vascular diuretic.

I will now conclude what I have to say by a few words on

CAFFEINE IN CARDIAC THERAPEUTICS.

This is a most valuable agent, and deserves a much more extended use than it has up to the present time received. In order, however, to obtain its full action, it is necessary to give it in much larger doses than is usually prescribed, 10 to 15 gr. in place of 2 or 3 gr. The best salt to prescribe is the natrio-salicylate of caffeine. The sodium salicylate dissolves it in chemically equivalent quantities, so that the natrio-salicylate of caffeine contains 50 per cent. of caffeine.

Caffeine quickly raises the blood pressure by a direct action on the vaso-motor centre. It has also a direct diuretic action. This, I think, has been conclusively proved by the very recent researches of von Schröder of Strassburg. He has shown that it has a direct stimulating influence on the epithelium of the convoluted tubules, and probably also on the epithelium of the glomeruli. It is on this direct diuretic action that the advantages of caffeine depend. Digitalis only acts as a diuretic through increasing the blood pressure, and on this account it takes from three to four days before its action is manifest. Caffeine, on

the other hand, will induce a diuresis within six hours. In cases of paresis of the cardiac muscle, time is all important; before the action of digitalis can be induced precious time is lost. This is the great drawback to the use of digitalis—*i.e.*, time consumed before its action is manifest. Our present knowledge of caffeine may be summed up as follows: It is of marked use in the same class of cases as digitalis. It differs, however, from this drug in the following particulars. It is less powerful as a cardiac tonic, but is a more powerful and prompt diuretic, and for this reason it gives relieve quicker from all the troublesome subjective symptoms of cardiac failure. By combining the power of digitalis with the rapidity of action of caffeine, we may obtain the advantages of both drugs, with little of the disadvantages of either.

There are many more therapeutic resources at our command besides those mentioned. Time will prevent me from referring to them. The wonderful powers of arsenic in painful conditions of the heart, the use of opium alone or with digitalis, the marked beneficial actions of the nitrites, etc., are all means at our command of relieving some of the most distressing states that afflict mankind. Much as we can do at present, there is every reason to hope that in the near future we will be able to do much more.

