ence gave license to wild theoretic speculation, leading to the adoption of empirical means to ends, and palliating most absurd errors of practice. But while all that confusion was in progress, Brown-Sequard, Bell, Marshall Hall and a few other savants of our profession were busily engaged in prying into the mysteries of the nervous system and laying a firm foundation for physiologic medicine, by which our art was made sure, and methods of practice simplified and placed on a scientific foundation. All these worthy pioneers in the field of neurology have passed away now, leaving their names already budding in fame to blossom out and reach remotest posterity.

In regard to the antitoxin theory now agitating the public mind and denounced by some physicians as a fad, we should be lenient in criticising the microbe theory of disease, for the reason that it seems to be proving its legitimacy as it goes on. If the Jennerian theory in regard to the antitoxin power of vaccine has been amply sustained in smallpox, how can we deny the sound efficacy of other similarly modified forces in relation to other constitutional diseases? Certainly, it seems equally plausible. And what is more, the inference leads to the conclusion that all constitutional diseases may be probably placed in the same category; and if so, the art of medicine is bordering on a revolution beyond anything of the kind in all the past. Let us wait and see.

ENLARGEMENT OF THE HEART WITHOUT VALVULAR DISEASE—WITH SPECIAL REFERENCE TO TREATMENT.

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If any excuse be needed for the presentation of this paper, it is found in the frequency with which individuals have consulted me of late, suffering from enlargement of the heart without valvular lesion. In looking over my record of cases for the twelve months ending Nov. 1, 1894, I find, that of the cases of heart disease there entered, 15.4 per cent. are under the diagnosis of idiopathic enlargement of the heart. Although open to the objection of vagueness and implied ignorance of the nature of the disease this term is, nevertheless, employed by Fraentzel because it embraces in concise form all those cases of hypertrophy and dilatation of the heart, unassociated with chronic endocarditis. On account of its conciseness, therefore, I shall make use of Fraentzel's term interchangeably, with that stated in the title of this paper.

Hypertrophy and dilatation are combined, the former predominating so long as compensation is adequate; but so soon as this becomes impaired, the hypertrophy begins to yield to dilatation until at length the latter assumes the chief rôle.

Post-mortem, these hearts are found to have greatly thickened walls, while the ventricles are dilated and the papillary muscles flattened. Fatty degeneration of the heart muscle is generally present, but in variable proportions and of too limited extent to make this the primary and main condition. Indeed, Fraentzel is of the opinion, that we shall have to abandon the notion of fatty heart as an independent and original

affection. There is, he says, no direct or constant relation existing between the extent of fatty degeneration and the gravity of the clinical appearances. In the very cases under consideration, demonstrable degenerative changes are by no means always so extensive as to explain the progressive cardiac failure. If sclerosis of the aorta and coronary arteries be absent or but slight, the heart muscle may present very insignificant evidences of fatty or other degeneration. In cases in which the cardiac enlargement is associated with general arterio-sclerosis or chronic interstitial nephritis, there may be microscopic, if not macroscopic, evidence of degeneration. In most instances, however, particularly those due to excess in food and alcohol (*Luxus consumption*) or to overwork, one is often astonished at the meager *post-mortem* findings, and also at a loss to explain the cardiac weakness.

This form of cardiac enlargement affects individuals of both sexes but more commonly males. They are usually men of large frames with capacious chests. Indeed, the amplitude of the thorax is a characteristic upon which Fraentzel lays great stress. The great predisposing cause of ventricular enlargement is prolonged high arterial tension. If this exist in the lesser circulation of chronic pulmonary disease, the right ventricle will become enlarged; but the cases, commonly presented to the physician, manifest enlargement of the left ventricle with secondary increase in the size of the right. Prolonged arterial tension in the systemic circulation results from a variety of conditions; such as 1, chronic interstitial and parenchymatous nephritis; 2, arterio-sclerosis; 3, excessive consumption of food or drink; that is, excessive with relation to the amount of exercise taken; 4, severe manual labor together with abuse of alcohol; 5, prolonged overstrain of the heart, as in soldiers, particularly, associated with abnormally small arteries. Other factors also concerned in the production of idiopathic enlargement of the heart, are too uncommon to be considered here.

Whatever the condition, it is essential that it produce and maintain, for a long time, abnormal blood pressure within the arterial system.

Let us consider a little more in detail the third factor of *Luxus consumption*. In this condition more food and drink are habitually taken than are required for the needs of the system, moreover these individuals generally follow a sedentary pursuit and, as a consequence of their physical indolence, often take on a large amount of adipose tissue as they pass their fortieth year. This is one type of the individuals described by Fraenkel as very apt to develop arterio-sclerosis. Through the circulation in the blood of toxins, resulting from their mode of life or some other reason, there is abnormally high arterial tension for years. Whether associated or not, with degenerative changes in blood vessels or kidneys, this abnormal blood pressure increases the work of the left ventricle. To overcome the peripheral resistance the left ventricle becomes hypertrophied. Compensation is thus established. After a time, peripheral resistance becomes too great for the enlarged ventricle and dilatation sets in. But the enlargement is not confined to the left side of the heart. Increased blood pressure also exists within the pulmonary vessels and occasions corresponding enlargement of the right ventricle. So long as the nutrition of the cardiac muscle is adequate to the increased demands made upon it there are no symp-

toms and the cardiac enlargement escapes recognition.

In the case of laborers or other individuals performing severe manual toil, abnormal blood pressure results from the frequent repetition of muscular contractions. If to this be added the injurious effects upon the circulatory organs of the habitual consumption of alcohol and tobacco, there is sufficient explanation of cardiac enlargement and ultimate loss of compensation.

Time forbids a detailed description of the symptomatology of this disease. The patient first becomes conscious of something wrong in his chest, through either dyspnea or a feeling of fullness and oppression in the precordium. The dyspnea, which in the beginning generally consists of breathlessness on ordinary exertion may increase to habitual shortness of breath or in the severer cases to attacks of cardiac asthma. A sense of fullness or oppression in the heart is very common and like the dyspnea, occasioned by exertion. Cardiac pain is rare, but when present, usually dull and associated with a feeling of weight. In only one of my cases was angina pectoris complained of and in this one this symptom was so frequent and violent, as to render sclerosis of the coronary arteries highly probable. The pulse is always tense and accelerated, often small, and regular or irregular, as the case may be. The arrhythmia so frequently mentioned by Fraentzel was present in but a small proportion of my cases and only those in which cardiac dilatation had been present for so long a time as to be a chronic condition. The urine is usually diminished in amount, of high specific gravity and contains a small percentage of albumen; hyaline and granular casts may or may not be found. The liver is generally somewhat enlarged from passive congestion. The peripheral arteries often feel a little thickened, in some instances slightly tortuous but do not usually present marked sclerosis. Edema is generally absent in the earlier stages or perchance confined to slight puffiness of the ankles.

As the malady progresses, edema and other symptoms increase, until at length the disease presents all the phenomena of cardiac asthystole from whatever cause. In the latter stages, cardiac asthma is apt to be particularly distressing.

These patients die, either from pulmonary edema or hypostatic congestion, due to progressive cardiac failure. Sudden diastolic arrest of the heart is not common, unless brought on by unwonted exertion.

The diagnosis does not usually offer much difficulty, and yet there are certain conditions that can easily prevent the recognition of the cardiac enlargement. The individuals most frequently presenting this disease are men with large, often round chests and correspondingly voluminous lungs. The left nipple is situated much further from the sternum than in those of average size, my records of measurements often showing it to be from four to four and one-half inches from the left sternal border. Ordinary methods of percussion show superficial cardiac dullness to lie between the left margin of the sternum and the left nipple. The capacious lungs conceal the deep limits of heart dullness, while the apex beat is neither visible nor palpable, partly because of intervening lung tissue and partly on account of the feeble impulse of the heart. For these reasons the practitioner is very likely to pronounce the heart of normal size. Fraentzel thinks, however, that the

very fact of superficial dullness reaching to the nipple in these broad chests is sufficient to indicate an abnormally large heart and that this consideration, in connection with high arterial tension and perhaps thickened arteries, justifies the diagnosis of idiopathic enlargement. Although believing this theoretically correct, I am personally in the habit of depending on auscultatory percussion to corroborate the results of percussion after the ordinary method. By this means and the auscultation of the heart's sounds, I have frequently determined great general enlargement and located the apex beat far to the left of its normal site.

The heart sounds are usually free from murmur, the first at the apex being weak and valvular. The second aortic sound is usually accentuated in consequence of the increased blood pressure in the arterial system. The normal rhythm of the sounds may assume more or less that of the fetal heart sounds. In one of my cases, a female, a distinct jogging sensation was transmitted through the monoral stethoscope.

Finally, the abnormal pulse tension, the pulse rate, and the symptoms are of great diagnostic significance.

In the early stages, appropriate treatment may do much to stay progress, nay, even to remove much of the cardiac insufficiency. When compensation has once been fairly lost, the physician is powerless to do more than mitigate symptoms. In my opinion the first condition of successful treatment, and one which I always follow is to explain to the patient the injurious effects of persistent high blood pressure, and the importance of lessening it so far as possible. He is warned against still further dilating his heart through too great muscular efforts. Stair climbing, hurried walking, carrying of heavy packages are absolutely forbidden. Moderate walks upon the level ground and for distances too short to produce fatigue are encouraged. The feeling of oppression and fullness in the precordium is found to be a good gauge of the patient's endurance; since he is cautioned against ever walking so fast or far as to produce this uncomfortable sensation. As a matter of fact, more than one patient has told me he found a slow walk in the open air relieved the discomfort in his chest. Patients are also instructed to avoid distending the stomach by too hearty meals and beer or other effervescing drinks. For the same reason, the diet is regulated so as to prevent fermentation and consequent distension of the digestive tract by flatus. Most saccharin and amylaceous articles are forbidden, therefore, as well as most uncooked fruits such as apples. Coffee and tea are allowed sparingly. The chief meal is at mid-day and if milk does not disagree, it must constitute the main portion of the evening meal. Alcoholic beverages, excepting malt liquors and champagne, which are absolutely interdicted, may be permitted sparingly or forbidden altogether according to circumstances in each case. My belief is that whisky in small amounts with the meals serves as a beneficial stimulus to both digestion and circulation. If the individual be corpulent, reduction of his weight is desirable but must be done cautiously.

Only woolen underclothing should be worn and all the clothing should be loose and comfortable, so as not to constrict chest and abdomen. Warmth of the body during cold weather is imperative lest the vasomotor constriction, produced by cold, increase

peripheral resistance and thereby also intra-cardiac blood pressure to an injurious extent. These patients should not attempt walking in the face of a strong cold wind. If possible, they should pass the inclement seasons in a mild equable climate. Massage and Swedish movements given skilfully and carefully, often prove highly beneficial. The immoderate use of tobacco and alcohol, sexual excess, fits of anger or emotional excitement of other kinds, too close and prolonged application to business are all injurious and should be explained as such to the patient.

As gentle exercise is beneficial, so on the other hand, prolonged rest in bed, so useful in certain valvular lesions, is injurious in idiopathic enlargement of the heart. Fraentzel explains this on the hypothesis that the heart muscle, being striated, degenerates under prolonged rest in the same way as does voluntary striped muscle after a long period of inaction. As I have stated elsewhere, this seems to me incorrect, since the cardiac muscle can never during life be subjected to complete repose. The injury resulting from absolute rest in these cases is explicable, I think on the following hypothesis:

In consequence of feeble contractions of the left ventricle, blood pressure in the aorta sinks, with corresponding rise of pressure in the two venæ cavæ. Moreover, absolute physical rest deprives the venous circulation of the aid derived from muscular contractions and deepened respiration. The work of maintaining the circulation is, consequently, thrown upon the already weakened left ventricle, which speedily succumbs under its increased labor.

This hypothesis is not at variance with the clinical observation of high pulse tension, since this is due to obstruction to capillary outflow and not to powerful contractions of the left ventricle. It is better, therefore, that these patients take rest for short periods, and for the purpose of recovering from fatigue occasioned by exercise.

We now come to the consideration of the medicinal treatment. Our first indication is to lessen the abnormal arterial tension which has led to the cardiac enlargement. This is best and most speedily accomplished by free catharsis. It makes but slight difference what purgatives are used, although they should not be highly drastic. I generally administer a full dose of calomel on account of the power possessed by mercurial preparations of diminishing arterial tension, even before producing alvine discharges. The calomel is generally followed in six or eight hours by a saline such as epsom salts or one of the laxative waters, Rubinat Condal, Hunyadi Janos or Franz Joseph. I not infrequently prescribe 4 ounces of the compound infusion of senna to be taken in one draught, which occasions profuse but painless watery stools. This remedy is specially recommended by Fraentzel. The effect on the pulse is often very remarkable, shown by greater regularity and volume. The sphygmographic tracings before and after the purge often exhibit striking diminution of tension. But this is not all; the dyspnea and sense of precordial oppression are usually lessened and sometimes wholly removed temporarily. It is well to keep down tension by the daily administration of a saline cathartic, but of less than the initial dose. The omission of the cathartic for even two or three days is generally followed by appreciable increase of arterial tension and of symptoms.

Digitalis and its congeners have no place in the therapeutics of this affection, unless weakness be confined to the left ventricle, the integrity of the right being preserved when moderate doses are useful. But if there be general weakness with dilatation of both ventricles these drugs are harmful. I have used them, and I have repeatedly seen them followed by increase of symptoms and arrhythmia or by irregularity of the pulse that previously had been regular. Why this is, I can not now attempt to explain, as it would require a lengthy discussion, both of the action of digitalis based on experiments of Openchowsky, and of the conditions of the circulation in this form of heart disease. The inutility, nay the harmfulness of digitalis in these cases is an empirical fact, the recognition of which has rendered my results far more satisfactory. Fraentzel employs cardiac stimulants, musk, castoreum and valerian, which not only spur on the jaded organ but favorably influence arterial tension. I have administered elixir of the valerianate of ammonia, nitroglycerin, whisky, tincture of castor, and in one instance even sulphate of atropia in doses sufficient to produce its physiologic effect upon the throat and pupils. Camphor and compound spirits of ether might be added to this list. The action of these stimulants is fugacious and therefore they must be exhibited frequently. Improvement is necessarily slow, and when any stimulant or combination of stimulants has demonstrated its ability to sustain or reinvigorate the heart's action its employment must be continued so long as required by the exigencies of the case. Nitrate of strychnia is also a powerful heart tonic, but must be given in full doses and when possible subcutaneously. Another useful and I believe positive heart tonic is the hourly inhalation of at least a gallon of pure oxygen.

Unfortunately there are many cases beyond the possibility of more than temporary relief. A most valuable stimulant in these, particularly if nightly attacks of cardiac asthma are distressing, is the hypodermic injection each evening of $\frac{1}{8}$, still better, $\frac{1}{10}$ of a grain of morphin combined with atropin, as in the ordinary hypodermic tablets. The dose must be small so as to secure the stimulant and not the depressing effect of the morphin. Given in this way, as Fraentzel says, a patient can often be carried along for weeks or even months after all hope of permanent improvement has been abandoned. Should dropsy finally set in and resist the use of cathartics and diuretics, such as calomel and perhaps also diuretin-knoll, it may be drained away by small incisions of the ankles or the use of appropriate drainage tubes.

The time limit of the papers necessarily forbids a more detailed discussion of the treatment, as well as the consideration of many questions that are suggested. I feel that I have been able to only outline what I believe to be the correct principles in the management of idiopathic enlargement of the heart.

Finally, three of my cases in which compensation was either threatened or not irretrievably lost, were treated by the Schott method of baths and gymnastics. The results were most gratifying and in one case truly surprising. The apex beat, previously neither visible or palpable, became fairly well defined, while appreciable retraction in the size of the heart took place and the patient regained ability to walk without much discomfort. This mode of treatment seems to me particularly adapted to this class of cases. It

unloads the over-distended heart, strengthens its contractions and dilates the arterial system; the very effects so desirable to produce in cases in which the heart is unequal to the abnormal blood pressure.

Appended are four sphygmographic tracings, of which Nos. 1 and 2 are from a man of 49, weight 260 pounds, suffering from general cardiac dilatation and chronic interstitial nephritis. The urine analysis showed in addition to abundant albumen and granular casts, blood, bile and indican. The first tracing was taken before treatment was instituted. The second was taken two days later after the administration of a vigorous purge and shows the beneficial effect of the same in this class of cases.

The third and fourth tracings are from a man of 60, who was beginning to manifest loss of compensa-

2. The primary condition is not fatty degeneration, which bears no definite relation to the clinical phenomena.

3. The disease results from prolonged high arterial tension and is observed most frequently in men with large chests and a tendency to corpulence.

4. Abnormal arterial tension may arise from excess in food and drink (*Luxus consumption*) and from severe labor, combined with immoderate use of alcohol and tobacco.

5. The diagnosis is not difficult, if one remembers that in these large chests actual cardiac enlargement may coëxist with a superficial precordial dullness, confined within the so-called normal limits.

6. The first indication for treatment is the lessening of the abnormal arterial tension, which is most

FIGURE 1.

FIGURE 2.

FIGURE 3.

FIGURE 4.

tion of an idiopathic enlargement of the heart. His chief symptom was precordial oppression. There was no apparent arterio-sclerosis and urinalysis revealed nothing more than chronic renal congestion. No. 3 was taken before beginning treatment and No. 4, five weeks later, shows the benefit derived from the management of this case, based on the principles laid down in this paper. It consisted, in brief, of gentle exercise by walking, daily catharsis, stimulants and regulation of the diet.

CONCLUSIONS.

1. By idiopathic enlargement of the heart is meant: combined hypertrophy and dilatation, without valvular disease.

readily done by means of cathartics and regulation of diet and exercise.

7. Digitalis is harmful, except in cases in which the weakness is confined to the left ventricle.

8. In cases of general cardiac enlargement and weakness, stimulants are called for, such as ammonia, nitro-glycerin, ether, valerian, etc.

9. The hypodermic injection of $\frac{1}{6}$ of a grain of morphin combined with $\frac{1}{200}$ of atropin is the most efficient stimulant in cases suffering from nightly attacks of cardiac asthma.

10. The Schott treatment, by baths and gymnastics, seems specially serviceable in this affection before compensation has become irretrievably lost.