feeling more seedy than usual for some days, sought advice, and was admitted. He was found to have considerable enlargement of the heart, and free aortic regurgitation was present.

Fig. 13.—Electro-cardiograms from the same case taken on the following day. The heart was beating regularly as before, but the auricular contractions P, which themselves remain unaltered in form, are now followed by the physiological type of ventricular curve, indicating in this case the subsidence of the conduction defect in the right branch of the bundle.

The pulse beat perfectly regularly at 64 per minute. There were no signs of venous stasis or of dropsy at his admission, but his temperature was 99°. On the second day it had risen to 100.5°, from which point it gradually fell to normal during the next few days. From this time it remained normal. Electro-cardiograms were taken for the first time on the third day during the pyrexial period; they were of very abnormal type (Fig. 12), and of the form which we now recognize as being characteristic of damage to the right bundle branch. On the succeeding day I had occasion to examine him again, and was surprised to find a complete alteration of the electro-cardiographic pictures. They had reverted to the physiological type (Fig. 13), and this

type was maintained during his stay in hospital.

The change may be interpreted in precisely the same manner that we have interpreted transient heart-block. It is probable that in this case, too, an invasion of the myocardium—which, from the temperature chart, we should be inclined to regard as infective—happened some little while before admission. The damage of the bundle branch was the sole sign detected, and this sign, like the heart-block of our other cases, was transient. It vanished, and the subsidence of the fever was not long delayed.

This is an isolated instance. I have little doubt that the observation will be often repeated, but as to the actual frequency of the phenomena I have but little knowledge. I have described the sign to you, although its value in general practice is negligible, for it serves to impress the lesson that important events occur in the hearts of our patients which we cannot detect by ordinary means; in the investigation of disease the sign is certainly of importance.

In conclusion, let me remind you that in a very large percentage of chronic heart cases we are unable to trace the cause of the disease; chronic heart disease is not always referable to definite illness from which our patients are known to have suffered; oftentimes the reverse is the case and the disease develops silently. If we can discover any indications which help us to recognize the presence of active processes in these patients from time to time—and such I believe are the physical signs which I have described—our knowledge of the disease moves forward by a distinct step.

REFERENCES.

- 1 Aschoff: *BRITISH MEDICAL JOURNAL*, 1906, ii, p. 1103.
- 2 Butterfield: *Heart*, 1911-12, iii, p. 203.
- 3 Cowan, McLeod, and Paterson: *Quart. Journ. of Med.*, 1910, iii, p. 115.
- 4 Cowan, Fleming, and Kennedy: *Lancet*, February 3rd, 1912.
- 5 Dunn: *Journ. Amer. Med. Assoc.*, 1908, i, p. 1985.
- 6 Fleming and Kennedy: *Heart*, 1910-11, ii, p. 71.
- 7 Gerhardt: *Deut. Archiv f. klin. Med.*, 1908, xciii, p. 485.
- 8 James: *Amer. Journ. Med. Sci.*, 1908, cxxxvi, p. 469.
- 9 Jellinek and Cooper: *BRITISH MEDICAL JOURNAL*, 1908, i, p. 796.
- 10 Mackenzie: *BRITISH MEDICAL JOURNAL*, 1902, ii, p. 1411.
- 11 Magnus-Alsleben: *Zeit. f. klin. Med.*, 1910, lxi, p. 82.
- 12 Price and Mackenzie: *Heart*, 1911-12, iii, p. 233.
- 13 Wenckebach: *Arrhythmia of the Heart*, London, 1904, p. 78.

OWING to the greater demands made upon the British Fire Prevention Committee for testing facilities, it has been decided to enlarge the testing station and to add to the plant. The main building is being rearranged so that the principal rooms will be available for the committee's technical and historical collections. It is anticipated that the alterations will be completed early in April, when the testing operations of the new session will be commenced with several tests on fire-resisting doors, various forms of glazing, and some new extinguishers; certain further tests with concrete floors, etc., and with partitioning materials, will also be carried out.

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MANIFESTATIONS OF A HEALTHY HEART.

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THE novel thesis set forth in Dr. James Mackenzie's article published in your issue of December 21st last, to the effect that irregularities of pulse frequency and functional murmurs are manifestations of a healthy heart, is one which demands careful consideration. I, for my part, beg to submit that those phenomena are partial expressions of a syndrome of which the fundamental conditions have to be sought elsewhere than in the heart. They are, in fact, signs of a consequential impairment of the heart muscle and of the arterial tunica media. They occur in association with a dicrotic pulse characterized by feeble development, or complete absence, of the predicrotic and post-dicrotic waves. The arteries, in fact, do not receive their normal fill of blood, and are practically empty during an undue proportion of the cardiac cycle. Such phenomena point to two defects: an inactive tunica media and consequent deficiency of recoil and of conductivity, and an actual defect of myocardial energy the importance of which is relatively aggravated by the fact of the central organ being called on to perform a considerable part of the work which should be carried out by the arterial heart. Under some circumstances, such as moderate exertion, or even menstruation during a period of invalid repose, the impoverished tunica media seems to pass temporarily out of action. It is easy to understand how great is the danger of heart strain if any effort be persevered in while that condition lasts. The syndrome in question is one of atony of the whole cardio-vascular system.

An almost universal symptom of that condition is an undue degree of postural tachycardia. The pulse is abnormally accelerated by the act of rising from the recumbent or sitting posture, and that acceleration will, in some cases, be indefinitely maintained until a position of repose is resumed.

The murmurs, also, which are so often to be heard in these cases, are so largely influenced by posture that in many instances they subside on the erect position being assumed, and are, in any case, loudest while the patient is in the recumbent position—that is, as Dr. Foxwell pointed out some years ago, while a distended right auricular appendix is pressing on the root of the pulmonary artery. It is difficult to determine whether the systolic apex murmur, which is sometimes to be heard, should be attributed to papillary weakness, to asthenic dilatation of the auriculo-ventricular ring, or to conduction. Dilatation of the pupil is a common feature of these cases, especially in the young. Irregularity of the pulse, if not actually present, is liable to be induced by any additional call on myocardial energy, or by vaso-dilatation however induced; though in the less severe cases the balance may sometimes be redressed by the stimulus of moderate exercise. In some, as has been stated by Dr. Mackenzie, the irregularity follows the respiratory rhythm; that is, the pulse falters synchronously with the descent of the diaphragm. In the majority of cases there is some degree of extension of the area of cardiac dullness. In childhood and adolescence the blood pressure is low.

As regards the etiology of these cases, careful investigation, especially when it can be carried back to the early stage of life, lights on some form of autotoxis. The most common is that of gastro-intestinal origin. In other subjects a rheumatic or gouty taint seems to bear a causative relation to the syndrome. Not a few subjects bear the rachitic stamp in the form of beaded ribs, retraction of the lower part of the sternum, or a tendency to pigeon-breast. But whatever the cause the result is a general impairment of power and efficiency, and a consequently diminished ability to bear strain, whether mental or physical. Such are the children and adolescents who become the subjects of the strain usually attributed to athleticism. Sound and healthy lads do not strain their hearts in ordinary and legitimate forms of game and sport, but those under consideration, short of wind, subject to palpitation and tumultuous action on exertion, and lacking in staying power, albeit full of pluck and will-energy, may meet misfortune in a football match, a paper-chase, a boat-race, or a game of rackets—I quote cases within

my knowledge. Even if they escape some form of breakdown, they plod on with something less than normal energy which may suffice to meet the requirements of a routine life; but they live on a lower plane than is their due. In manhood some are invalidated because they are unable to bear the strain of an active life at home or abroad, especially under the influences of a subtropical and humid climate. Others fail in route marching or break down in manœuvres, having persevered, in opposition to their instincts and judgement, under the influence of assurances that there is nothing organically wrong with them, and that their monitory symptoms and their misgivings are "all nerves." As they enter on or pass beyond middle life, the atrophied tunica media and the weakened myocardium being unable to accomplish the treble task of emptying the chambers of the heart, filling the aorta, and then driving the blood through the peripheral vessels, these subjects begin to experience the troubles and disabilities generally referred to as indicative of arteriosclerosis, but, as I would prefer to call it, atrophic dilatation as opposed to the hypertrophy to which the late Dr. Savill gave the name of "arterial hypermyotrophy."

The treatment to be adopted consists primarily in the correction of autotoxis, whether gastro-intestinal, rheumatic, gouty, or due to some pyogenic process. The greatest attention should be paid to diet and general hygiene, exercise being regulated in accordance with the response which may be expected from the circulatory mechanism. Baths and exercises administered according to the Schott-Nauheim method are of great value. Among pharmaceutical remedies, iron is not indicated; digitalis is sometimes useful, but adrenalin, administered by the mouth in doses of from 5 to 10 minims of the hydrochloride solution, stands pre-eminent. Its special office is to bring the tunica media into action, and, it would seem, to restore it to functional efficiency. I have employed it for years, and in every case made frequent manometric observations, which enable me to give unqualified denial to the prevailing suspicion that, thus administered, it raises blood pressure.

It is necessary to add that, during the period of growth and development, progress in the more marked cases is generally slow, and relapse the not uncommon penalty of undue and especially of sustained exertion.

Such in brief are the reasons why I should regard it as a misfortune were it accepted that functional murmurs and irregularities of pulse frequency are manifestations of a healthy heart, and as such to be regarded with complacent acquiescence.

By way of illustration I append the following sphygmograms. Fig. 1 is taken from a youth of 18 who had a functional murmur at the apex from ages 4 to 10. He broke down after a game of rackets at a public school in 1911. The tracing is typical of cardio-vascular atony.

Fig. 1.

Fig. 2 illustrates a severer form of the syndrome, and is taken from a lad of 13, who, after breaking down at school, developed loud apical and basic murmurs in conjunction with dyspnoea, palpitation on exertion, and some cyanosis. After a year's limitation of activity he recovered his health

Fig. 2.

to a great extent and the murmurs disappeared. He was then assured by a specialist that he might return to school and join, without restriction, in the usual games. The result was a relapse and a return of the murmurs.

The following illustrate the effects of treatment. Civil engineer, aged 30, treated for cardio-vascular atony in 1900. Health failed in India at the end of 1911. Figs. 3 and 4 were taken on the first day of treatment (February

Fig. 3.—Before bath.

Fig. 4.—After bath.

Fig. 5.—Before eff. bath.

Fig. 6.—After eff. bath.

2nd, 1912); Figs. 5 and 6 on completion (March 7th, 1912). Nauheim baths, adrenalin, gastro-intestinal correctives.

Army officer, aged 39. Nutritional and digestive troubles from childhood. Always "slack." Resigned his commission because he could not spend a day in the saddle nor

Fig. 7.—Before bath.

Fig. 8.—After bath.

Fig. 9.—Before eff. bath.

Fig. 10.—After eff. bath.

stand the strain of manœuvres. Figs. 7 and 8 taken on the first day of treatment (August 7th, 1911); Figs. 9 and 10 on completion (September 12th, 1911). Nauheim baths, adrenalin, gastro-intestinal correctives.