is most extensive. In one case I found in the wall of the right ventricle a mass which involved the anterior segment of the tricuspid valve and partly blocked the orifice. The surface was eroded and there were numerous cancerous emboli in the pulmonary artery. In another instance the heart was greatly enlarged, owing to the presence of innumerable masses of colloid cancer the size of cherries. The mediastinal sarcoma may penetrate the heart, though it is remarkable how extensive the disease of the mediastinal glands may be without involvement of the heart or vessels.

Cysts in the heart are rare. They are found in different parts, and are filled either with a brownish or a clear fluid. Blood-cysts occasionally occur.

The parasites will be discussed under the appropriate section, but it may be mentioned here that both the *cysticercus cellulosæ* and the echinococcus cysts occur occasionally in the heart.

Wounds and Foreign Bodies.

Wounds of the heart are usually fatal, although there are many instances in which recovery has taken place. Bullets have been found encysted inside the ventricle. A majority of the cases of gunshot wounds, however, are necessarily fatal. Puncture of the heart by a sharp-pointed body, such as a needle or a stiletto, does not always prove fatal. Peabody has reported a case in which a pin was found embedded in the left ventricle. Suicide has been attempted by passing a needle or pin into the heart. It is not, however, necessarily fatal. Moxon mentioned a case, at the Clinical Society of London, in which a medical student, while on a spree, passed a pin into his heart. The pericardium was opened, and the head of the pin was found outside of the right ventricle. It was grasped and an attempt made to remove it, but it was withdrawn into the heart and, it is said, caused the patient no further trouble. Hysterical girls sometimes swallow pins and needles, which, passing through the œsophagus and stomach, are found in various parts of the body. A remarkable case is reported by Allen J. Smith of a girl from whom several dozen needles and pins were removed, usually from subcutaneous abscesses. Several years later she developed symptoms of chronic heart-disease. At the post-mortem needles were found in the tissues of the adherent pericardium, and between thirty and forty were embedded in the thickened pleural membranes of the left side.

Puncture of the heart has been recommended as a therapeutic procedure to stimulate it to action, as in chloroform narcosis, and experimental evidence has been brought forward by B. A. Watson in favor of the operation. He advises abstraction of blood in combination with the puncture—cardiocentesis. The proceeding is not without risk. Hæmorrhage may take place from the puncture, though it is not often extensive.

At the Philadelphia Hospital the procedure was tried by one of the resident physicians in a case of acute dilatation. The anterior coronary vein was cut across and considerable blood was found in the pericardium. There is danger also of striking Kronecker's inhibition centre.

V. NEUROSES OF THE HEART.

Palpitation.

In health we are unconscious of the action of the heart. In some people one of the first indications of debility or overwork is the consciousness of the cardiac pulsations, which may, however, be perfectly regular and orderly. This is not palpitation. The term is properly limited to irregular or forcible action of the heart perceptible to the individual.

Etiology.—The expression "perceptible to the individual" covers the essential element in palpitation of the heart. The most extreme disturbance of rhythm, a condition even of what is termed *delirium cordis*, may be unattended with subjective sensations of distress, and there may be no consciousness of disturbed action. On the other hand, there are cases in which complaint is made of the most distressing palpitation and sensations of throbbing, in which the physical examination reveals a regularly acting heart, the sensations being entirely subjective. We meet with this symptom in a large group of cases in which there is increased excitability of the nervous system. Palpitation may be a marked feature at the time of puberty, at the climacteric, and occasionally during menstruation. It is a very common symptom in hysteria and neurasthenia, particularly in the form of the latter which is associated with dyspepsia. Emotions, such as fright, are common causes of palpitation. It may occur as a sequence of the acute fevers. Females are more liable to the affection than males.

In a second group the palpitation results from the action upon the heart of certain substances, such as tobacco, coffee, tea, and alcohol. And, lastly, palpitation may be associated with organic disease of the heart, either of the myocardium or of the valves. As a rule, however, it is a purely nervous phenomenon—seldom associated with organic disease—in which the most violent action and the most extreme irregularity may exist without that subjective element of consciousness of the disturbance which constitutes the essential feature of palpitation.

The irritable heart described by Da Costa, which was so common among the young soldiers during the civil war, is a neurosis of this kind. The chief symptoms were palpitation with great frequency of the pulse on exertion, a variable amount of cardiac pain, and dyspnœa. The factors at work in producing this condition appeared to be the mental excitement, the unwonted muscular exertion associated with the drill, and diarrhœa.

The condition is not infrequent in civil life among young men, and it leads in some cases to hypertrophy of the heart.

Symptoms.—In the mildest form, such as occurs during a dyspeptic attack, there is slight fluttering of the heart and a sense of what patients sometimes call "goneness." In more severe attacks the heart beats violently, its pulsations against the chest wall are visible, the rapidity of the action is much increased, the arteries throb forcibly, and there is a sense of great distress. In some instances the heart's action is not at all quickened. The most striking cases are in neurasthenic women, in whom the mere entrance of a person into the room will cause the most violent action of the heart and throbbing of the peripheral arteries. The pulse may be rapidly increased until it reaches 150 or 160. A diffuse flushing of the skin may appear at the same time. After such attacks, there may be the passage of a large quantity of pale urine. In many cases of palpitation, particularly in young men, the condition is at once relieved by exertion. A patient with extreme irregularity of the heart may, after walking quickly one hundred yards or running up-stairs, return with the pulse perfectly regular. This is not infrequently seen, too, in the irregular action of the heart in mitral-valve disease.

The physical examination of the heart is usually negative. The sounds, the shock of which may be very palpable, are on auscultation clear, ringing, and metallic, but not associated with murmurs. The second sound at the base may be greatly accentuated. A murmur may sometimes be heard over the pulmonary artery or even at the apex in cases of rapid action in neurasthenia or in severe anæmia. The attacks may be transient, lasting only for a few minutes, or may persist for an hour or more. In some instances any attempt at exertion renews the attack.

The *prognosis* is usually good, though it may be extremely difficult to remove the conditions underlying the palpitation.

Arrhythmia.

An intermission occurs when one or more beats of the heart are dropped. Irregularity is the condition when the beats are unequal in volume and force, or follow each other at unequal distances. Allorrhythmia is a term which is also used to express deviations from the normal heart rhythm.

The following varieties of arrhythmical action may be recognized:

(1) The paradoxical pulse of Küssmaul, in which the beats during inspiration are more frequent but less full than during expiration. This is found in weak heart, in chronic pericarditis, and when fibrous bands encircle the root of the aorta; but it may also occur normally from the influence of the respirations upon the heart. It is sometimes to be felt in sleeping children.

(2) Intermittence, in which there is simply an intermission or dropping of a cardiac beat. The term deficience is more correctly applied to those instances in which the absence of the heart-sound proves that the systole is really omitted. The systole may be so weak as not to produce a pulsation, and yet at the same time a feeble first sound may be heard.

(3) The alternate heart-beat, in which strong and weak pulsations alternate regularly and which is expressed in the peripheral arteries by alternate full and feeble pulse-beats.

(4) The bigeminal and trigeminal pulsations occur when two or three beats follow each other in rapid succession, each group being separated from the following by a longer interval. This is not very uncommon in mitral disease. In the bigeminal pulse the first beat of the pair is usually the stronger. Indeed, in the condition known as heart bigeminism the second systole is so feeble that the pulse wave does not reach the peripheral arteries and the two systoles are represented by only a single pulse-beat at the wrist.

(5) Delirium cordis, in which these various factors are combined and the heart's action is wholly irregular.

(6) Fœtal heart rhythm—embryocardia—described by Stokes, is a very common condition in which the long pause is shortened and the characters of the sounds are "almost completely identical." The resemblance to the fœtal heart-beat is very striking. In the later stages of fevers and in extreme dilatation this form of heart rhythm is very frequently heard.

(7) Gallop rhythm, in which the sounds resemble the footfall of a horse at canter, usually results from the reduplication of the second sound in a rapidly acting heart. It is expressed by the words "rat-ta-tat." Sometimes it seems as if the first sound was split; more commonly it is the second. It is most frequently heard in interstitial nephritis and arterio-sclerosis, but it is said to be met with also in healthy persons.

The causes of these various disturbances of rhythm are thus classified by G. Baumgarten:*

(1) Those due to central—cerebral—causes, either organic disease, as in hæmorrhage, or concussion; more commonly psychical influences.

(2) Reflex influences, such as produce the cardiac irregularity in dyspepsia and diseases of the liver, lungs, and kidneys.

(3) Toxic influences. Tobacco, coffee, and tea are common causes of arrhythmia. Various drugs, such as digitalis, belladonna, and aconite, may also induce it.

(4) Changes in the heart itself. (*a*) In the cardiac ganglia. Fatty, pigmentary, and sclerotic changes have been described in cases of this sort and may have an important influence in producing disturbances in the rhythm; but as yet we do not know their exact significance. They

* Transactions of the Association of American Physicians, vol. iii.

may be present in cases which have not presented arrhythmia. (*b*) Mural changes are common in conditions of this kind. Simple dilatation, fatty degeneration, and sclerosis are most commonly present, the two latter usually associated with sclerosis of the coronary arteries.

The significance of arrhythmia is not always easy to determine. Simple irregular action of the heart may persist for years. The late Chancellor Ferrier, of McGill University, a man of unusual bodily and mental vigor, who died at the age of eighty-seven, had an extremely irregular pulse for almost fifty years of his life. One or two other instances have come under my notice of persons in good health, without arterial or cardiac disease, in whom the heart's action was persistently irregular. The bigeminal and trigeminal pulsations are found more frequently in mitral than in other conditions. The delirium cordis is met with in the dilatation associated with valvular lesions, particularly toward the latter stages. Fœtal heart rhythm is rarely found apart from dilatation.

Rapid Heart—Tachycardia.

The rapid action may be perfectly natural. There are individuals whose normal heart action is at 100 or even more per minute. It may be caused by the various conditions which induce palpitation; but the two are not necessarily associated. Emotional causes, violent exercise, and fevers all produce great increase in the rapidity of the heart's action. The extremely rapid action which follows fright may persist for days, or even weeks. Traube reports an instance in which, after violent exercise, the rapid action of the heart continued. Cases are not uncommon at the menopause.

There are cases again in which the condition can hardly be termed a neurosis, since it depends upon definite changes in the pneumogastrics or in the medulla. Cases have been reported in which tumor or clot in or about the medulla or pressure upon the vagi has been associated with heart hurry. Some of the cases of frequent action of the heart in women have been thought to be due to reflex irritation from ovarian or uterine disease.

Paroxysmal tachycardia is a remarkable affection, characterized by spells of heart hurry, during which the action is greatly increased, the pulse reaching 200 and over. The cases are not common. The condition has been thoroughly studied by Nothnagel. The attack may be quite short and persist only for an hour or so. A patient at the Philadelphia Infirmary for Nervous Diseases was attacked every week or two; the pulse would rise to 220 or 230, and there were such feelings of distress and uneasiness that the patient always had to lie down. There may be, however, no subjective disturbance, and in another case the patient was able to walk about during the paroxysm and had no dyspnœa. One of the most remarkable cases is reported by H. C. Wood. A physician in his eighty-

seventh year has had attacks at intervals since his thirty-seventh year. The onset is abrupt and the pulse rapidly rises to 200 a minute. For more than twenty years the taking of ice-water or strong coffee would arrest the attacks. Bouveret has analyzed a number of cases of this essential or idiopathic form; he finds that a permanent cure is rare, and that the patients suffer for ten or more years. Four instances terminated fatally from heart-failure. Wood suggests that these cardiac paroxysms are caused by discharging lesions affecting the centres of the accelerator nerves. François Franck has shown that the acceleration of the heart's action is due to the shortening of the diastole, and during the systole so little blood is expelled from the heart that the average amount in the minute is not increased. Moreover, the accelerators appear to have no trophic relation to the heart, and stimulation of them is not accompanied either by increased arterial pressure or by augmentation of the work done by the heart.

Slow Heart—Brachycardia (*Bradycardia*).

Slow action of the heart is sometimes normal and may be a family peculiarity. Napoleon is stated to have had a pulse of only 40 per minute.

In any case of slow pulse it is important first to make sure that the number of heart and arterial beats correspond. In many instances this is not the case, and with a radial pulse at 40 the cardiac pulsations may be 80, half the beats not reaching the wrist. The heart contractions, not the pulse wave, should be taken into account. A most exhaustive study of this condition has been made recently by Riegel, whose division is here followed:

(*a*) Physiological brachycardia. In the puerperal state the pulse may beat from 44 to 60 per minute, or may even be as low as 34. It is seen in premature labor as well as at term. The explanation of its occurrence at this period is not clear. Slowness of the pulse is associated with hunger. Brachycardia depending on individual peculiarity is extremely rare.

(*b*) Pathological brachycardia, which is met with under the following conditions: (1) In convalescence from acute fevers. This is extremely common, particularly after pneumonia, typhoid fever, acute rheumatism, and diphtheria. It is most frequently seen in young persons and in cases which have run a normal course. Traube's explanation that it is due to exhaustion is probably the correct one. (2) In diseases of the digestive system, such as chronic dyspepsia, ulcer or cancer of the stomach, and jaundice. The largest number of Riegel's cases were of this group. (3) In diseases of the respiratory system. Here it is by no means so common, but is seen not infrequently in emphysema. (4) In diseases of the circulatory system. Excluding all cases of irregularity of the heart, brachycardia is not common in diseases of the valves. It is most frequently seen in fatty and fibroid changes in the heart, but is not constant in them. (5) In diseases of the urinary organs. It occurs occasionally in nephritis and