ON RECURRENT PALPITATION OF EXTREME RAPIDITY IN PERSONS OTHERWISE APPARENTLY HEALTHY.

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THE subject to which I wish to direct attention is that of extremely rapid pulsation, occurring for the most part in intermittent paroxysms of variable duration, in hearts structurally and texturally sound, and in persons otherwise healthy.

That hearts may beat with the extreme rapidity with which I have found them to beat, is a fact which, I think, has been largely overlooked, and with which I, at any rate, had no practical acquaintance until within the last two or three years; and yet I feel sure, judging from my recent experience, that the condition which I am about to discuss is of frequent occurrence, and needs only to be looked for intelligently to be recognised in many persons who are regarded as merely nervous and liable to attacks of ordinary palpitation.

So far as I know, the literature of the subject was, until recently, limited to the report in the 'British Medical Journal,' for the year 1866, of three well-marked cases, the first from the pen of the late Dr. Cotton, and the others respectively by Dr. James Edmunds and the late Sir Thomas Watson. Of these cases I need only say, that they almost accurately resembled the most striking and typical of the cases which are incorporated in this paper; that the cardiac pulsations during the paroxysms of palpitation were at the rate of about 240 in the minute; that in the intervals the patients appeared to be well and free from heart disease; and that in Sir Thomas Watson's case (which proved suddenly fatal) the heart was found to be soft and somewhat enlarged, but otherwise healthy.

The first typical case of the disease which I ever fully recognised was one which I saw in consultation with Dr. Wyman, of Putney, in the early part of 1885. The patient was a fairly healthy-looking young married lady, who had evidently been liable for some years to attacks of palpitation, and was free from structural disease of the heart. The attack in which I saw her came on suddenly, without apparent cause, and after a week left her as suddenly as it had arisen. Her pulse varied between 180 and 192 in the minute. A few weeks later she had a recurrence of palpitation, when the cardiac beats were counted at 246. What seemed to me at the time the most remarkable feature of her case was the apparent absence of distress. Had I not known that the patient's heart was beating with extraordinary rapidity it would never have struck me, from watching her and conversing with her, that there was anything the matter with her.

CASE I.—Paroxysmal Hurry of Heart of Some Years' Duration.

Mrs. P., a married lady 30 years of age, was attacked about six weeks before I saw her with pleuro-pneumonia of the right side, from which she had apparently recovered completely at the end of about four weeks. A few days before my visit (April 5th) she had taken a drive. This seems to have upset her; for on her return home she was attacked with retching, dyspnoea and nervousness. The retching soon ceased; but the pulse was found to be beating with great rapidity (about 180 in the minute), and this rapid pulsation has continued. She has been kept in bed, complaining of fluttering in the region of the heart, slight dyspnoea and nervousness; but otherwise has appeared fairly well. When I saw her she was sitting up in bed, looking bright and cheerful, but pale and delicate. There was no obvious dyspnoea, although perhaps she breathed a little more quickly than normal, and no cough. The heart was beating regularly at the rate of 192 in the minute. It was not enlarged; and the sounds, which were short and sharp, were unattended with murmur. The lungs were healthy. There was no abdominal affection; the urine was free from albumen, and no anasarca was present. Her tongue was a little furred; and her appetite not very good. There was no goitre or exophthalmos.

The patient had been married for three years, and had no family. She said that formerly she was stout; but that for several years

past she had been, as she now was, thin; and that she had been liable for some years past to attacks which seemed to her like that for which she was now under treatment. They came on suddenly, without cause, and after lasting for a few days subsided suddenly. She had consulted medical men, and had been told that she had heart disease, and had been directed not to exert herself, and especially not to hasten up hill or up-stairs. She had never had rheumatism.

On this occasion the heart continued to act with extreme rapidity for a week, and then suddenly its beats fell to 110 in the minute, and shortly afterwards to 92. I saw her again on the 20th of April. The pulse was beating at the rate of 92 in the minute, and quite regularly. There was no cardiac murmur, and she appeared to be, and expressed herself as feeling, perfectly well.

About a month or six weeks later she had another similar attack, in the course of which the pulse reached 246 in the minute. It was unattended with dyspnoea, and there was no rise of temperature.

My second case was admitted into St. Thomas's in July of the same year. It was that of a man between 30 and 40 years of age who had suffered from heart disease ever since an attack of acute rheumatism eight years previously. He had obstructive and regurgitant aortic and regurgitant mitral disease, with hypertrophy and dilatation of the heart. There was reason also to believe that the arch of his aorta was dilated. He presented all the usual signs and symptoms of abundant aortic regurgitation. It appeared that for several months before admission he had been liable to attacks of palpitation; and during the three months he remained under my care he had many such attacks. They came on suddenly at irregular intervals, night or day, without obvious cause, continued for periods which varied between half an hour and thirty-six hours or more, and subsided suddenly. While in his attacks, he complained of feeling ill, faint and weary; and his pulse ranged from 160 to 200 in the minute. In the intervals it varied from 80 to 100. He came under my care for the second time early in 1886, and remained in hospital for a period of four months. For the first two months he suffered, precisely as he had done previously, from recurrent attacks of palpitation, after which I treated him for the first time

systematically with digitalis and iron; and with the best results, for the attacks at once diminished, and during the last six weeks of his residence in hospital, he remained entirely free. He died shortly afterwards; but I have not been able to obtain any information as to the circumstances of his death.

CASE II.—Double Aortic and Mitral Disease, and probably Aortic Aneurism; Ascites; Paroxysmal Hurry of Heart; Death.

William N., a dealer, 34 years of age, first came under my care on the 30th of July, 1885.

At the age of twenty-six he had a severe attack of rheumatic fever, and has never felt well since. A few months ago he began to suffer from palpitation, short breath and cough, which often came on in severe paroxysms, and finally prevented him from doing his work.

He was an exceedingly pallid man, complaining of the symptoms above enumerated. The præcordial dulness was extensive. The heart was much enlarged; its apex beating in the 6th interspace, about three inches below, and an inch and a half to the left of the nipple. There was marked pulsation over the whole of this area, and also in the inner part of the right second and third intercostal spaces. The action of the heart was regular, and attended with a musical systolic murmur at the apex, and a well-marked double murmur at the base. There was some crepitation at the lower part of both lungs. The cough was attended with a good deal of frothy expectoration. The urine contained a trace of albumen.

The patient remained in the hospital until the 31st of October, presenting in a greater or less degree the symptoms above described, and suffering also from great distress and weariness, and not unfrequently from pain extending down the left arm. The most interesting phenomenon in his case, however, consisted in the frequent supervention of attacks of palpitation. These came on suddenly, without definite cause, sometimes in the night, sometimes in the day, and ended suddenly, also without definite cause. They lasted from three-quarters of an hour to 36 hours or more at a time; and while present the rate of the pulse (which for the most part continued regular) varied from 160 to 200 in the minute. Most commonly it was about 180. The attacks came on irregularly, sometimes every day, occasionally even twice a day, and often at intervals of several days. During them the patient felt ill, faint and weary, but did not suffer from cardiac pain. He complained of

dyspnoea, but the respirations were for the most part only about 32. He was liable to slight rises of temperature; but there was no obvious relation between them and the palpitation. In the intervals between his attacks the pulse varied from 80 to 100, was generally regular, and presented a well-marked aortic regurgitant character. Various remedies were given with the object of arresting the palpitation. But latterly nitro-glycerine alone was employed, in doses varying from $\frac{1}{100}$ to $\frac{1}{25}$ grain. This was thought to relieve him at times. But I am doubtful whether it had any real influence over the action of the heart.

On the 12th of February, 1886, he was again admitted under my care. He had suffered during the interval from frequent attacks of palpitation, and latterly his belly and legs had become swollen, and he had had severe attacks of epistaxis. His abdomen was tapped on the 4th of March, when 14 pints of serum were removed; on the 27th, when $12\frac{3}{4}$ pints were taken away; and lastly on the 18th of April, when the amount withdrawn was 13 pints. After theappings the liver was found to be considerably enlarged. The removal of the ascitic fluid relieved the patient's breath, and rendered him generally more comfortable, but had no material influence over the attacks of palpitation.

These continued, in fact, without change of character up to the 13th of April; they were just as severe, just as frequent, and just as irregular in their occurrence and duration as they had been during his former stay in the hospital. On the 13th of April, with the object partly of benefiting the dropsy, partly of influencing the attacks of palpitation, a mixture, containing ten drops of tincture of digitalis, five grains of tartrate of iron and calumba, was ordered to be taken every six hours. This was five days before the last of the threeappings above mentioned. During the next week or two there were two or three short attacks of rapid action of the heart, and then they ceased altogether; so that during the remainder of his stay in the hospital, a period of about six weeks, he continued quite free from them. Moreover, although for a short time the ascitic fluid seemed to be re-accumulating, it soon ceased to collect; and when he left the hospital there was little or none remaining. Nevertheless, for some two or three weeks after the last tapping, although not suffering from palpitation, he was extremely ill, very weak, very drowsy, inclined to ramble at times, and had several severe attacks of epistaxis. Then he improved somewhat, and though weak and ill when he left the hospital, was, on the whole, a good deal better than when he was admitted. During both his residences in the hospital his urine contained more or less albumen, and his temperature varied from

97 to 101. In the intervals between the attacks of palpitation his pulse ranged from 80 to 110, and was apt to be irregular. And after the last tapping his respirations were, on the whole, more rapid than they had been previously, and often rose to 40 or even 50 in the minute.

He left the hospital on the 7th of June, apparently much better than he was when admitted, but still very ill. He died at home three or four weeks later.

My next case was that of a lady, 49 years of age, who for several years had had a largish goitre; but, so far as could be ascertained, had not suffered from palpitation, or other symptoms of Graves's disease. When I saw her she had been complaining for two or three weeks of cough, dyspnoea, and great rapidity of heart's action. It had been ascertained on several occasions that the beats were about 200 in the minute. At the time of my visit she was in bed, complaining of a frequent dry cough and palpitation; but in other respects seemed to be in fair health. The heart (the apex of which was somewhat displaced to the left) was beating at the rate of 180 in the minute, and somewhat irregularly. Its sounds were free from murmur, and no evidence whatever of disease either in the thorax or in the abdomen was discovered. I saw her again three days later. She was then very restless and ill, and her cardiac pulse, which had been 240 the night before, was now about 220. There was still no discoverable visceral disease. The next day her urine was found for the first time to contain a good deal of albumen. She died the following night. I am inclined to think that the goitre in this case was a mere accident of the case, and did not imply the presence of Graves's disease, and to suspect that the attack in which the patient died was only the last of an unrecorded series of such attacks.

CASE III.—*Goitre—Rapid Action of Heart—Restlessness—Albuminuria—Death.*

Mrs. P., aged 49, a patient of Dr. Wyman's, of Putney, has, on the whole, had good health; but for several years has had a largish goitre, which is said latterly to have caused some difficulty of swallowing. She has been treated with iodide of potassium,

and, it is believed, with benefit. There has never been an exophthalmos, or stridor, or, so far as is known, attacks of palpitation.

Her present illness began two or three weeks before I was asked to see her, on the 16th of February, 1886; and has been characterised by cough without expectoration, shortness of breath, and great rapidity, with some irregularity, of heart's action. Her illness, however, has not prevented her from performing her accustomed household duties; and it was only yesterday that, by Dr. Wyman's orders, she took to bed. Her pulse has been several times counted, and found to be about 200 in the minute. Her appetite has been poor, but she has slept well, and her urine has been free from albumen.

She was a healthy-looking woman; and, as she lay in bed, seemed free from dyspnoea and all other kinds of distress. The goitre was rather large. There was no lividity or anasarca. Her tongue was clean. She complained of cough, but it was not severe, and there was no expectoration. No evidences of disease were discovered in the lungs. The præcordial dulness was rather large, and the heart apex was thrown a little outwards, but there was no undue prominence. The pulsation was somewhat diffused. The heart was beating slightly irregularly, at the rate of 180 in the minute. The sounds were short and sharp, but free from murmur. No pericardial friction; pulse weak, somewhat irregular. No evidence of abdominal or renal mischief.

I saw her again three days later (the 19th). She was then very ill. It appeared that she had been getting worse, and that since yesterday she had been extremely restless, rarely sleeping, and then only for a few minutes at a time, and constantly rambling. There was no sickness; but she had taken little food, and the bowels had been somewhat confined. Her evacuations had been passed consciously. The pulse last night had been 240. The urine had been free from albumen; the temperature a little above the normal. She was now exceedingly restless, tossing her limbs about, and shifting her position constantly. She was rational, but her articulation was very indistinct. Skin dry, but not hot; tongue thickly coated. Occasional cough, but no marked difficulty or acceleration of breathing. Chest resonant, breath-sounds healthy. Præcordial region as before. No pericardial or cardiac murmurs. Action of heart somewhat irregular, and varying from 200 to 220 in the minute. No paralysis, no affection of pupils, no fits—nothing in fact to point to cerebral mischief. Goitre unchanged.

I heard the next day that the patient was still extremely restless; that her pulse continued about 220; and that she seemed

sinking. The urine now was found to contain a considerable quantity of albumen. She died either that night or the next morning early.

The case of Miss J., which follows, is one of remarkable interest. She was a highly intelligent and active-minded woman, and for three or four years had occupied a post which not only involved continuous official labour and much responsibility, but required her two or three times a year to make a tour of inspection embracing some of the larger provincial towns. Her attacks of palpitation began about the year 1870, when she underwent a long spell of hard work and anxiety, which was followed by a long period of sleeplessness. The first attack came on quite suddenly, and after half an hour ceased suddenly. Subsequently she had many such seizures, coming on at variable intervals often of many months, and usually without apparent cause. They increased latterly, but rather in duration than in frequency. The attack immediately previous to the one in which I attended her, came on towards the end of 1885, and lasted for six weeks, during the whole of which time her cardiac pulse was regular, and varied from 200 to 260 in the minute; and she continued to do her official work, and generally to act as though she were a healthy woman. Her next attack came on on the 10th or 11th of April, 1886, and ten days later I saw her for the first time. She was then suffering from a troublesome cough, and complaining (as was usual during her attacks) of fidgetiness, and of feeling in a hurry; but otherwise she seemed well, and was performing her official duties as usual. Her cardiac pulsations had ranged between 200 and 250 in the minute, and at the time of my visit were 216. There was no obvious enlargement of the heart; its sounds were free from murmur, and no evidence of disease was discovered either in the other thoracic or in the abdominal organs. At the end of five weeks the pulse suddenly fell to the normal, and for five days continued normal. On the 10th of May, without warning, the palpitation recurred; and, while still suffering from it, she determined to go on one of her periodical tours of inspection. She was feeling very poorly

when she left London on the 1st of June; on the 4th of June, for the first time in her life, her legs became swollen; on the 9th, she reached Liverpool, and feeling very ill, telegraphed for her brother-in-law to fetch her. Nevertheless on that day she spent six hours in inspection. It only remains to say that from this date she suffered from anasarca, pulmonary apoplexy and pleurisy, that the rapid action of her heart continued, and that finally she died with the usual symptoms of cardiac inadequacy on the 10th of July.

It is remarkable that, excepting during her last attack of palpitation, which was unusually prolonged and doubtless aggravated by persistence in the performance of laborious work, Miss J. suffered little while her heart was beating with extraordinary rapidity, and was able to take long walks, and to perform systematic and laborious mental and bodily work. She usually complained of discomfort and worry when the palpitation came on, but soon apparently became reconciled to it, only feeling somewhat irritable and restless. It is remarkable, too, that there was no clear evidence even of cardiac hypertrophy or dilatation.

CASE IV.—Paroxysmal Hurry of Heart and Restlessness of Fifteen Years' Duration—Death with Symptoms of Cardiac Obstruction.

I first saw Miss J., aged 40, with Dr. Floyer on the 21st of April, 1886. She had then been suffering for ten days, and was still suffering, from an attack of palpitation.

Her history was as follows:—She had had good health down to the time of the Franco-Prussian war, when, owing to circumstances on which it is needless to enter, she was for some time overworked and had much responsibility thrown upon her. Following on this she suffered for some months from sleeplessness, and had to take chloral. It was about this time that she had her first attack of palpitation. It came on suddenly and left her suddenly, lasting for about half an hour. This attack was followed by others, which seized her at irregular but long intervals, often of many months. These have increased upon her of late, but rather in duration than in frequency. They have come on without warning, and for the most part without obvious cause; but she thinks they have sometimes been induced by dancing and excitement. The last attack occurred in the latter part of last year, and continued

day and night for about six weeks. Like all its predecessors, it began and ended suddenly. The palpitations have always been a cause of distress to her; but have never prevented her from taking exercise or performing whatever duties she has had to perform. For the last three or four years she has been a Government inspector of needlework, and her employment has obliged her to spend some hours daily in official work at Westminster, and periodically to visit various towns in England for the purpose of inspecting the needlework at certain schools; and she has performed these duties thoroughly, even while the attacks of palpitation have been on her, and apparently with injury. What has been the rate of the heart's contractions during the numerous attacks she has experienced I cannot say; but in the last one it certainly varied between 200 and 260 in the minute. The higher number was more than once counted by Dr. Sharkey, who was seeing her at that time. She says that she always feels much distressed when an attack first comes on; but that afterwards she gets accustomed to it, and the distress diminishes; and that she cannot lie on her back or left side on account of the unpleasant throbbing of her heart; but otherwise is unconscious of its rapid action. Her main complaint is that when the palpitation is on her she always feels irritable, fidgety, and in a hurry as if (to use her own expression) she was impelled "to do three days' work in one." She has not been troubled with shortness of breath. She has never had rheumatism, chorea, enlarged thyroid or exophthalmos. She has not been hysterical, and the catamenia have been regular.

Her present attack, as has been stated, came on suddenly ten days ago, and has continued ever since, her pulse ranging the whole time between 200 and 250 in the minute. She has had an irritating cough upon her for some days, which seems to have added to her discomfort; and consequently for a day or two she has remained at home.

She was a healthy-looking woman, apparently not suffering much distress; and indeed no one to look at her or to converse with her would have thought there was anything the matter with her. There was no lividity or puffiness of face, no distress of breathing. Now and then, however, she had a rather violent paroxysm of coughing, attended with little or no expectoration. On examining the chest, the heart was found to be beating at the rate of 216 in the minute, and regularly. Its sounds were short and sharp, and quite free from murmur. The apex of the organ was not displaced; and the præcordial dulness was not enlarged; but the pulsation of the heart was diffused. The lungs were resonant and

the respiratory sounds were normal. There was no sign of abdominal affection. The urine was free from albumen. She was eating and sleeping fairly well. I may mention here that she was a singularly bright, intelligent and well-informed woman; and not only took great pleasure in her official duties, but was generally well-informed, and could talk sensibly and pleasantly, and with piquancy, on many subjects.

The next time I saw my patient was on the 3rd of May. I called on her at her office late in the afternoon. She had been performing her daily duties ever since I last saw her; and now, having been at her post fully employed from an early hour in the morning, was preparing to leave. She looked well, conversed freely and without difficulty, and said that she felt well but for the feeling of unrest, and the impulse to hurry, which were always present when her heart was acting rapidly. The heart was beating at the rate of 208 in the minute; and had been going on thus without intermission for twenty-two days. She still had a little cough.

I did not see her again until the 30th of May. I learnt then that she had awoke on the morning of the 5th of May with her pulse at 120, and feeling quite well; that in the course of the day the pulse had fallen to its normal rate, varying between 70 and 80; and that for five days she continued absolutely healthy. This subsidence of the rapid cardiac action was not due to any obvious cause. She had been working hard and sleeping badly down to the very moment of its occurrence. On the 10th, without manifest reason, the morbid action of the heart recommenced suddenly, and it has continued ever since.

She was not feeling well at the time of my visit; she had been sleeping badly, her appetite had been poor, she had occasionally been retching in the morning, and she had felt weak; moreover she had been suffering from cough. But she had been doing her work thoroughly, and contemplated starting on a visit of inspection to Durham, Liverpool and some other towns. Her heart at this time was beating regularly, and at the rate of 232 in the minute. There was no murmur; the sounds were quite distinct; but there was scarcely any interval between the first and second. The pulse was weak, and could not be counted at the wrist. Her breathing was quick, but I was unable to determine its rate because it always underwent unintentional modification when I tried to count it. But she did not complain of dyspnoea, and spoke as usual freely and without difficulty. There was no lividity or anasarca. The lungs were normal.

On the 1st of June she started alone for the north, as she had

intended, and visited amongst other towns Durham, and lastly Liverpool. She felt ill when she left London, and continued feeling ill during the whole of the time she was away. She suffered from a noisy, distressing and paroxysmal cough. On the 4th of June for the first time in her life her legs became cedematous, and the cedema increased during the rest of her journey. On the 9th she spent six hours in inspecting a school at Liverpool; but she did it with difficulty, and in the evening was brought up to town by her brother-in-law, who had been sent for to her from London.

I paid her a visit on the 10th. She was then extremely ill. Her breath was short; her cough (unattended with expectoration) was very troublesome and violent; she complained of much pain in the præcordial and epigastric regions and across the lower part of the back. Her tongue was clean, but she had loathing of food and frequent sickness; no affection of fauces could be discovered; the lungs were resonant, and the breath-sounds normal; the heart was beating regularly and without murmur, at the rate of 208 in the minute; there was tenderness below the ribs in the hepatic region, and apparently slight enlargement of the liver; and the urine was scanty; her legs were cedematous, and she perspired profusely.

Afterwards she passed a very restless night, suffering much from cough and dyspnoea, and from præcordial and epigastric pain. And when I saw her on the afternoon of the 11th she was much worse than I had yet seen her. She was perfectly sensible; but the præcordial pain, and distress were so great, her breathing was so difficult, each recurring paroxysm of cough was attended with so much aggravation of her sufferings, and she was so collapsed, that her life was believed to be in imminent danger. Her pulse was regular, and 240. There were no abnormal cardiac or respiratory sounds. A few whiffs of chloroform gave great relief to her cough; and in the belief that her sufferings were largely due to over-distension of the right side of the heart and to congestion of the liver, twenty leeches were applied to the præcordial region. These bled freely, and gave her great and immediate relief.

When I visited her on the 12th, I found that she had had a fairly comfortable night, and that she continued much easier. But she was very weak, had occasional attacks of dyspnoea, her cough, though reduced in severity, continued, and her legs were still anasarctous. She did not complain of palpitation, but her heart was beating 240 in the minute. Her respirations were 40. The urine, for the first time, was found to contain a little albumen, but no casts were discovered. The chloroform still relieved her cough.

During the next day or two there was no very great change in her condition on the whole; she had fairly good nights, owing probably to the subcutaneous injection of morphia, her cough was better, but her appetite was very poor, and at times she went off into an alarming state of collapse.

On the afternoon of the 14th she was attacked with agonising pain in the region of the heart—so severe that she was constantly clutching at the left breast with her hand, rocking herself to and fro, and crying out and groaning. She was very pale and ghastly-looking, but not distinctly livid. The pain was continuous, was much like that she had suffered from previously, and did not appear to be true angina pectoris. The inhalation of nitrite of amyl was had recourse to, however, and with some degree of benefit. Chloroform was subsequently employed. And between them, these remedies, and the application of dry mustard to the chest, gave considerable relief. During this time her pulse was 208, and her respirations 40; and for the first time I detected a little crepitation at the base of the left lung. Her temperature was 100·4.

About 7 p.m. Dr. Floyer gave her 30 grains of bromide of potassium, and at 7.40 injected one-eighth grain of morphia, after which she had some sleep. About 9.30 she awoke, and felt what she termed a "lilt" in the region of the heart, or as if "one of its cogs was broken," she became at the same time more faint than she had ever felt before, and thought she was dying. Her sister came to her at once, and found her almost insensible and perfectly quiet, with cold extremities and imperceptible pulse. A minute or two later her brother-in-law arrived. She had already rallied somewhat; but she was still much prostrated, her hands were cold and clammy, and her surface generally perspiring profusely. Her pulse had fallen to 136. She soon recovered from her collapse, and subsequently passed a comfortable night.

On the next day, the 15th, she was much better than she had been for some time. She had little or no distress of any kind; her appetite had improved; her cough had almost subsided; she had no pain; she looked bright; her pulse (which could be easily counted at the wrist) varied between 128 and 132; the temperature was 99; and the urine (which had a specific gravity of 1008) was free from albumen. I thought, also, that the dropsy of the legs had diminished.

From this time down to the evening of the 23rd, the improvement seemed to be maintained, if not to progress. She slept fairly well, and for the first time since her journey to the north was able to lie down; her appetite improved; her pulse varied from 112 to

128; and she "felt at peace." Also the dropsy seemed to be diminishing. But her cough became a little more troublesome; there was some crepitation at both bases, and her temperature was febrile, on one occasion rising to 102. On the 23rd she had seemed as well as she had been during the previous few days. In the evening she took 20 grains of chloral, and slept comfortably for an hour or two. Then she woke up suddenly with a severe stitch in the right side of the chest; shortly afterwards had a very severe and painful attack of coughing; and while it was in progress felt a sudden throb in the region of the heart. The pulse at once jumped to 180 or 185 in the minute; and all the old sense of nausea, distress, and hurry returned. When I saw her on the afternoon of the 24th, she looked ill; her tongue was coated, and her appetite gone; she still had a stitch in the right side, and was breathing 40 in the minute; and her pulse varied between 200 and 208. There was no dulness on percussion over the lungs, but loud pleural friction was audible over the whole front of the right side. Her temperature was 100. Ten leeches were applied to the affected side, and much relief to her symptoms ensued.

For the next fortnight there was no material change in her condition, excepting that during the whole time her cough, which was troublesome, was attended with hæmoptysis. The blood was mixed with mucus, was variable in quantity, but never abundant, and generally brownish or rusty-coloured. It was evidently the hæmoptysis of pulmonary apoplexy, to which the pleurisy also no doubt was due. The pain and friction in her right side subsided, and the sickness and loathing of food diminished. But her pulse continued at the rate of 208 in the minute; her breathing was somewhat rapid; and it was thought there was a little fluid in the left pleural cavity; she complained at times of pains in the hepatic region; the swelling of the legs continued, although it was thought that it was gradually diminishing; and her temperature remained elevated by a degree or two. It may be added, that the action of the heart continued to be regular; that no cardiac murmur was ever detected; that there was no clear evidence that the organ was enlarged; and that the veins in the neck were not dilated.

I was sent for on the morning of July 10th, and reached her at 1.30 P.M. I learnt that she had been attacked during the course of the previous night with extreme dyspnoea, which had continued. When I saw her she was moribund. She was sensible, but disinclined to answer questions; she was breathing quickly with rattles in her throat, moaning and frequently calling out for relief; her face was extremely pale, her extremities were cold and her pulse at

the wrist could not be felt; but her heart was acting regularly, and still about 200 in the minute. She died at 3 P.M.

No autopsy was made.

My fifth case possibly does not belong to the same category as those which precede; at any rate irregularity of cardiac action was as marked a feature as frequency of action, and the palpitation (so far as I know) was persistent. The patient was a spare, healthy-looking, elderly man, accustomed to field sports. He had had, he said, "a sunstroke" a year previously, and had been liable to headaches ever since. Five or six months before I saw him, it was discovered accidentally that there was something wrong with his heart. I saw him on two occasions, and on both found his heart beating irregularly at the rate of between 144 and 148 in the minute. He was not nervous at the time, had no cardiac discomfort, and indeed (excepting for the fear that he had heart disease, as he had been told he had) felt and looked quite healthy. There was no evidence of enlargement of the heart and no murmur. And he assured me that within the last few weeks he had run three miles in twenty minutes without distress.

CASE V.—*Sunstroke (?)—Headache—Rapid Action of Heart.*

Mr. S., a spare, healthy-looking country gentleman, aged 65, accustomed to shooting, riding, and out-of-door exercises, called upon me on the 21st of June, 1886. He has had excellent health down to a year ago, when on a very hot day, being on the sea-shore in command of a Volunteer Artillery Corps, he had what was called a sunstroke. What the symptoms were, beyond severe pain at the top and back of the head, I do not know. He does not appear, however, to have had a fit. This pain continued for three weeks, and since that time he has been liable to frequent recurrences of it. For some time past it has been a dull aching all round the head, but mainly on the left side, where it becomes acute when he sneezes or coughs. It is generally absent at night and in the early morning; but it comes on after luncheon, and increases until bed-time. He sleeps well. He suffers slightly from indigestion, and his appetite is not very good. For two months in the early part of the year he was confined to bed with some inflammation of the right big-toe. This was, so far as I can

make out, certainly not gout. He has suffered from occasional rheumatic(?) pains for years. It is stated that the medical man who attended him when his foot was bad, detected "slight valvular disease of the heart."

At the time of his visit he was feeling very fairly well; and I should have regarded him as being healthy had not I found his heart beating at the rate of 144 in the minute, and somewhat irregularly. He did not appear to be, and said he was not, nervous; and, indeed, his cardiac pulsations underwent no change during the whole of our interview. He was not himself conscious that there was anything unusual in the action of his heart; had no uneasy sensation in the præcordial region, and had no shortness of breath. He assured me, in fact, that within the last few weeks he had run three miles in twenty minutes, without the least distress. There was no evidence of enlargement of the heart, and no trace of murmur. All his other organs appeared to be perfectly healthy. His urine was free from sugar and albumen. I ordered him a mixture containing digitalis, iron, and ammonia, and some *cannabis Indica*, in the form of a pill.

On the 30th I saw him once more. There was no material change. His heart was beating at the rate of 148, and apparently quite regularly; but the beats at the wrist were unequal in force, and occasionally imperceptible, so that the radial pulse felt irregular. No cardiac murmur, no dyspnoea, no anasarca. He complained only of headache at times, lassitude, and impairment of appetite.

Mr. C., my next patient, called on me about a week later than the last. He had consulted me in 1879, at which time his heart was acting with much irregularity and frequency. Although I could discover no definite sign of heart disease, and he complained little of distress, I confess I took an unfavourable view of his case. He got well, however, while taking iron and digitalis. In 1883 I saw him again, when he was suffering from a similar attack; and he informed me that he had had such attacks occasionally ever since I had seen him. When he came to me in June, 1886, he looked, and on the whole felt, well; but his heart was beating with slight irregularity at the rate of 168 in the minute; and he furnished me with a written statement of the number and duration of attacks of palpitation he had had during the previous eighteen months. From that time until his death

in June, 1887, the action of his heart continued irregular and rapid; and although never, so far as I know, attaining 200 beats in the minute, frequently I believe presented a rate of 300 beats per minute for a few seconds at a time. He continued apparently well (excepting for the rapid action of his heart) until about a month before his death, when the ordinary symptoms of obstructive heart disease came on.

CASE VI.—Paroxysmal Hurry and Irregular Action of Heart of Seven Years' Standing—Death.

Mr. C., a short, healthy-looking, commercial gentleman, about 38 years of age, called on me on the morning of the 28th of June, 1886. He told me that he had been attacked suddenly on the 25th with violent palpitation of the heart, which had continued without intermission ever since. It came on without definite cause. He has felt poorly and disinclined for work, and indeed has taken a holiday from business, but has not felt seriously ill. On presenting himself before me, he looked, and spoke, and acted exactly as a healthy man might do; there was no obvious distress, no hurry of respiration, no congestion or lividity of face, and no anasarca. But his pulse was 168 in the minute, and slightly irregular. The præcordial distress was not more extensive than normal; and the apex of the heart impinged in the usual place. The sounds were short and sharp, and quite free from murmur. There was no further evidence of disease anywhere.

About the year 1875 he had syphilis, followed by secondary symptoms, which have never recurred. In Sept. 1879, he was brought to me for consultation, by Dr. Johnstone English. Two months previously he had begun to complain of uneasiness at the pit of the stomach, supposed to be due to indigestion; this had continued, and it was discovered that his heart was acting with great irregularity. At the time of his visit to me he was pale, he complained of slight shortness of breath, his urine contained a little albumen, and his heart was acting very rapidly and with much irregularity. But I could discover nothing else. He had no cough, no anasarca, the lungs were free from congestion, and the heart was apparently of normal size, and its sounds were unattended with murmur.

I was much puzzled about the case, for there was nothing whatever in the history (excepting the previous attack of syphilis) to suggest a cause for the symptoms, and there was nothing to prove the presence of organic heart disease. It was agreed, however, that

he should abstain from business (which he had been attending to hitherto) for a month, and should take iron and digitalis. He got apparently quite well in a short time.

In November, 1883, he called upon me again. He told me he had had good health, excepting that at irregular intervals he had had attacks of palpitation, which were always relieved by the medicine which Dr. English and myself had prescribed for him. He was now suffering from an attack. He complained of a little shortness of breath in going up-stairs, and that he was conscious of the beating of his heart. But otherwise he felt well, and he looked well. There was no anasarca. The heart was beating very quickly and irregularly, and no murmur was to be detected. No definite cause could be assigned for the attack, unless it was that he had been sitting up late. He was a bachelor, and I suspected his habits were irregular.

When he came to me in the present year, he told me that he had continued liable to attacks of palpitation; and he furnished me with the dates and durations of his attacks since the beginning of 1885, as follows:—March 30th, 36 hours; April 13th, 33 hours; May 19th, 18 hours; July 29th, 57 hours; August 2nd, 4 hours; October 22nd, 46 hours; Nov. 25th, 44 hours; Jan. 6th, 30 hours; Jan. 31st, 22 hours; Feb. 24th, 12 hours. He could not always assign a cause for the attacks, but occasionally he thought they followed a little over-indulgence. They seemed always to be benefited by recourse to the iron and digitalis.

He called upon me again on the 1st of July. He had not been feeling well; but had slept well, and looked well. His pulse was beating between 120 and 130 in the minute, and was very irregular. On the 7th he again paid me a visit. He was much better; and ate, slept, and looked well. But he still complained of a little cardiac discomfort. The pulse was irregular and beat 80 times in the minute; but if it had been acting regularly at its generally prevalent rate, the beats per minute would have been 100. His normal rate of pulse, he told me, was about 60. He had been taking his old prescription. It was decided that he should take a few weeks' holiday on the Continent.

Termination of the Case.—The above case was written out for publication, together with several of the other cases, very nearly 12 months ago. The patient has died since, and I here add a brief statement of his subsequent history.

After I saw him in July, he went to Zermatt for a month. He did not climb, but habitually walked three or four miles a day; and returned benefited in general health by his trip, but still with a rapid irregular pulse.

He called upon me in the latter part of February of the present year, complaining of what he called indigestion. This seemed to consist mainly in an aching pain across the upper part of the belly induced mainly by taking exercise. The heart was beating irregularly, 160 in the minute; and I thought the abdominal pain was due to hepatic congestion. On the 2nd of April I saw him again. He was still complaining of abdominal pain; but in other respects felt, and he looked, well. I examined his heart very carefully on this occasion. Its action was very irregular, presenting two distinct alternating rhythms, each lasting for two or three seconds. In the one the heart was beating at the rate of 80 to 100 in the minute; in the other, at the rate of at least 240. There was diffused cardiac pulsation, but the præcordial dulness was not enlarged, the apex beat in its normal situation; there was no murmur, and the second sound at the left base was not accentuated. On May 4th he paid me another visit. He still had the epigastric pain, and for two days had been suffering from diarrhoea. I again examined his heart carefully. It was beating as before. But on several occasions during the brief periods in which it was beating most rapidly, I counted quite distinctly at least ten beats in two seconds; so that quite certainly, although the heart was not accomplishing more than about 160 beats in the minute, these were frequently at the rate of 300 per minute. After this he went to the Isle of Wight for a few days; but he became very ill there, and returned to London in the middle of May, suffering from great difficulty of breathing, general anasarca, and pain and tenderness in the region of the liver. He was livid, and his urine presented a trace of albumen. Dr. Wilbe was called in to attend him, and I met him in consultation. It is sufficient to say that, although the pulse on the whole became more slow and regular, the usual symptoms of obstructive cardiac disease continued; pleurisy with effusion on the right side, for which he had to be tapped on two occasions, supervened; and he died on the 9th of June. No post-mortem examination was permitted.

My seventh case is in many respects the most interesting of the series. The patient was a young man, whose illness apparently dated from a strain twelve years before. There is some reason to believe that, ever since that time, he had had occasional attacks like that for which he came under my care. This had already lasted three months when I saw him; he had only been laid up, however, for six weeks, and latterly he had had some œdema about the ankles. During

the earlier part of his stay in the hospital, his pulse varied in rapidity, often rising to 250 or 260 in the minute, and often presenting considerable irregularity of action, the beats at such times being apt to present sudden alternations of rate between 240 or 250 and half that number. At this time he complained of sickness, aching across the upper part of the belly, and attacks of faintness, associated with lividity and dyspnœa; moreover, the slight anasarca continued, a little albumen appeared in the urine, and he spat a little blood. After a short time he was treated with iron and digitalis, and much benefit resulted; for although his cardiac pulse continued variable, at times quick and at times irregular, it became comparatively slow after a few days, and then fell to 50 or 60 in the minute. On one occasion it sank to 34. With this change the other symptoms of cardiac disease (anasarca, hæmoptysis, albuminuria, &c.) all disappeared, and he left the hospital apparently well at the end of a month. He thenceforth visited me at intervals as an out-patient. For a month he remained at home, and then resumed his occupation. While thus attending, he reported himself as being on the whole fairly well, but liable to attacks of faintness and palpitation. At the time of his visits to me his heart was often found beating at the rate of only 70 or 80 in the minute; but it was liable to be irregular in its action, and its rate would often rise suddenly to 250 or 260. On one occasion I counted the cardiac beats to be 308 in the minute. On the whole the patient seemed to be going on well, but twelve weeks after he first came under my care, and at a time when he seemed to be in the enjoyment of good health, he died quite suddenly. It was noted during life that the heart was enlarged, and that always when it was acting at a healthy rate there was a systolic murmur at the apex. It was believed, however, that the valves were really healthy. At the autopsy the heart was found to be somewhat large and dilated; but the muscular tissue and the valves were healthy, and the ventricles were empty.

CASE VII.—*Rapid Action of Heart—Sudden Death—Autopsy.*

Arthur W., a draper's assistant, 19 years of age, was admitted into St. Thomas's, under my care, on the 4th of December, 1886.

He has had most of the ordinary diseases of childhood, but never any serious illness. When 8 years of age he took part in a paper-chase, but after running across two or three fields, had to stop suddenly on account of a severe pain in the region of the heart. He leant against a tree, and was speechless for some minutes; but was able to walk home. After that, running was prohibited for a time. He seems to have been liable to palpitation on exertion, especially on running up-stairs, ever since; but has otherwise had excellent health up to three months ago, from which time he dates his present illness.

He was then attacked with general aching pains and sense of poorliness, some cough, and shortness of breath. The symptoms persisted, but nevertheless he continued to follow his employment for six weeks. At the end of this time, his abdomen was swollen, and his legs were œdematous, and his palpitation and dyspnœa had increased. Latterly, too, he has complained of aching across the upper part of the belly, and of vomiting. He has had syphilis.

The patient was a tall, well-made, and, on the whole, healthy-looking man, complaining of sickness, cough with slight expectoration, shortness of breath, palpitation, and swelling of the lower extremities. His face was somewhat pale, with perhaps just a trace of duskiness, and there was slight œdema about the ankles; the thyroid body was not enlarged, and the eyes were not prominent. At the time of admission it was noted that the heart was beating between 240 and 250 to the minute; that pulsation could be felt and seen over the whole præcordial region, and that the cardiac sounds, which were quite distinct, were free from murmur. The præcordial dulness was somewhat extensive, beginning in the third interspace above, and extending slightly to the right of the sternum. The apex impinged in the 5th interspace about half an inch outside the nipple. The lungs were resonant, and, excepting that on deep inspiration some finish crepitation was audible at the right base, the breath-sounds were healthy; expectoration slightly tinged with blood; respirations 32. There was no ascites or evidence of enlargement of abdominal organs. The urine had a sp. g. of 1025, and was free from albumen. Tongue clean, appetite good, bowels regular, temperature normal.

Dec. 5th, 2 p.m.—The patient has had several attacks of

fainting during the morning. They are said to have been attended with dyspnœa, and temporary stoppage of the heart, followed by over-violence of action. When I saw him the pulse at the wrist was irregular and impossible to count. On listening over the præcordial region the heart's action was found also to be irregular and very rapid. For periods of ten seconds or so at a time it was beating at the rate of 200 in the minute; then a strong beat would occur, and the pulse would drop for some seconds to a rate of 108; and again, after a short time, another throb would come, to be followed by renewed over-rapidity. This alternation of very rapid and comparatively slow pulsation continued during the whole time he was under observation. On one occasion the beats fell to 84. At 4 P.M. he was complaining of feeling faint, and his heart was beating at 250 in the minute. His breath was short.

Dec. 6th.—He had several attacks of sense of suffocation and faintness during last evening and night. They came on for the most part as he was dozing off, and prevented him from sleeping. About one o'clock in the morning he was in great distress; very restless, and wanting to get out of bed. He had half a drachm of aromatic spirits of ammonia and ten minims of tincture of digitalis given him, and became easier in the course of half an hour. The heart, when it was examined this morning, was beating at the rate of 164, and regularly. He has been complaining of nausea, and his feet are still œdematous.

Dec. 7th.—Passed a better night; had no return of faintness. When examined this morning the heart's beats were 182 in the minute; at half-past three in the afternoon they were 208. Cough better, expectoration less; urine sp. g. 1025; no albumen.

Dec. 9th.—Improving; but heart beating 224 in the minute.

Dec. 11th.—Seemed better all yesterday; but became poorly during the night; was restless, and suffered from nausea, sickness and diarrhœa. In the early morning the cardiac pulsations were 256; at 11 A.M. the cardiac pulse was declared by himself, and said by the sister of the ward, to be very slow. At noon, however, it had risen to 264. The respirations were then 28, and sighing; and the pulse could not be felt at the wrist; skin dry. *Midnight.*—Was sick at 4 P.M. During the evening has suffered from dyspnœa and palpitation; face now congested, lips and eyelids bluish; skin cool, perspiring; very restless and thirsty; heart's pulsations 256; respirations 28, and sighing; has spat a little bright blood. Ordered fifteen minims of tincture of digitalis.

Dec. 12th.—An hour and a half after taking the digitalis

he lost his lividity; felt easier, and inclined to sleep; but the heart's action remained rapid. Afterwards passed a fair night, and was tolerably comfortable in the morning. At 10 A.M. the cardiac pulse was 200; at 2 P.M. 220; the urine for the first time presented a trace of albumen. Ordered ten minims of tincture of digitalis, five grains of tartrate of iron, with infusion of calumba every four hours.

Dec. 14th.—The patient is much better; no recurrence of dyspnœa or faintness, and no return of hæmoptysis; no albumen in urine. He says that he feels "like his old self." But the pulse is still rapid. In the morning the heart's beats were counted at 168. At 3 P.M. the heart was again examined; it was then acting irregularly; at one time at the rate of 168, at another at that of 192, with short intervals of uncertainty.

Dec. 17th.—The patient has been going on well. The heart, however, has been acting variably, and, on the whole, rapidly. The cardiac beats have ranged from 120 to 132. At the present time the action is generally regular; but occasionally there are series of alternate strong and weak beats, the former only causing perceptible pulsation at the wrist.

Dec. 19th.—Doing well, and feels well. Pulse 60, regular and soft; no anasarca.

From this date until he left the hospital on the 5th of January he continued to feel in his ordinary good health; all faintness and dyspnœa, cough and anasarca, had disappeared; his appetite was good, his urine free from albumen, and he slept well. The heart's pulse was usually regular and about 60 in the minute; occasionally, however, it went down to 52, or rose to 78. On one occasion (December 21st) when I came into the ward the cardiac beats were only 34 in the minute: and the patient, though otherwise feeling well, complained of his heart thumping; consequently, the mixture containing digitalis, which hitherto he had been taking every four hours, was directed to be given thenceforth three times a day. On another occasion, while examining his heart (which was then acting regularly 60 times in the minute), I made him hold his breath for a few seconds, when immediately its action became irregular, presenting alternate strong and weak beats, at the rate (in combination) of 80 in the minute. The irregularity suddenly ceased after some seconds, and the rhythm and rate of movement returned to their previous condition.

When the frequency of the heart's action became permanently reduced, a soft systolic murmur was recognised at the apex. This had never been detected while the heart was acting rapidly, and was never observed to be absent when the organ was beating

slowly. It was perfectly distinct, but was inaudible in the back. All the other cardiac sounds were normal; and the second sound at the left base was not accentuated.

During the times at which the heart was acting rapidly, there was diffused pulsation over the præcordial region. This I examined particularly on two or three occasions, and came to the conclusion that the impulse corresponding to the surface of the right ventricle was synchronous with the apex beat. When the patient left the hospital, the heart's apex was situated just internal to the nipple. The radial pulse, excepting when the heart was beating slowly, was always very small and very feeble, and seemed to be irregular. It did not admit of being counted.

During the patient's stay in the hospital, his temperature rose on one or two occasions to 99, or a little more, and on one or two fell to close upon 95. It usually ranged between 97 and 98.6.

When he left he had gained flesh, and he looked, and (save for the presence of the mitral systolic murmur) might have passed for a healthy man.

After his discharge on the 5th, the patient remained quietly at home for a month or so, and then resumed work as a linen-draper's assistant, travelling every day three or four miles backwards and forwards between his home and place of business; and he came to my ward as an out-patient on several occasions. The following are the subsequent notes that were taken.

Jan. 7th.—Woke up at 6 A.M. yesterday morning with pain in the chest, and palpitation lasting about 10 minutes, and ceasing abruptly with a few forcible beats. Cardiac pulse counted immediately after he had walked up-stairs to the ward, and found to be 264, and regular. A little later it had risen to 288. Shortly afterwards, having rested for a while, the pulse had dropped to 84. Half a minute later it was 116, but irregular. After lying down for a short time it was 72, and regular. No murmur heard while the heart was beating rapidly. Pulsation diffused over whole cardiac area. Ferri Tart. gr. viij; Tinct. Digitalis mx; Inf. Calumbæ ʒj; t. d. s.

Jan. 18th.—Has had many attacks of palpitation both night and day, and there is a little return of œdema. At the present moment he feels well, but the heart is beating irregularly. Tinct. Digitalis mxv; ex haust.

Jan. 28th.—On the 26th, when getting into an omnibus, had an attack of faintness, lasting a second or two. Thinks he lost consciousness. But he has, on the whole, been much better than he

was previous to the last visit. Indeed, although his heart is beating at the rate of 220 in the minute, he is not conscious of palpitation, and feels and looks well.

Feb. 11th.—The patient has continued much better. But while under examination he complained of palpitation, and of a slight sense of faintness. During his visit the heart was acting regularly on the whole, but with extreme rapidity; on several occasions I counted the beats at 256 in the minute, and on several they varied distinctly between 300 and 308. During the examination he was standing up, and made no complaint. But on looking at him, his face seemed rather dusky, and I made him lie down. After a short time I examined him while he was still recumbent, and found his pulse at the wrist 64; the heart's beats being double that number, and alternately strong and feeble.

Feb. 18th.—Has continued to feel well, palpitation came on as he stood up to be examined, and the heart's beats were then 256 in the minute.

Feb. 23rd.—On this evening I got the patient to attend a meeting of the Neurological Society. He felt and looked perfectly well. His heart was beating regularly, and not rapidly, when he first entered the room. But soon the beats rose temporarily to about 240, and many of the members had the opportunity of verifying the fact. Several also of the members verified the presence of an apex systolic murmur when the heart was acting slowly.

After this he continued apparently very well. On the 26th (Saturday) he was engaged in business till midnight, and went home afterwards. The next morning (Sunday) he got up feeling quite well. He ate a good breakfast, and at one a good dinner; after which he went upstairs and played upon the piano. Suddenly the music stopped, and a fall was heard. On entering the room immediately afterwards, his friends found him lying on the floor dead.

Autopsy on the fourth day after death. Body much decomposed; some old pleuritic adhesions; lungs healthy; pericardium healthy; the heart generally was somewhat enlarged and dilated, and weighed $17\frac{3}{4}$ oz. Its muscular tissue was soft and flabby (doubtless from decomposition). The valves were perfectly healthy; all the cavities were nearly empty. Examined microscopically the muscular tissue showed no sign of degeneration.

There was no evidence of disease in any of the abdominal viscera.

The nervous centres were healthy, as were also the vagi and sympathetic cords in the neck and thorax.

Besides the above cases I have, since I have been on the look out for them, seen several which are obviously of the same class, but whose significance I should probably have formerly overlooked. The following is one of the most interesting and typical of them :

CASE VIII.—*Paroxysmal Palpitation apparently due to Strain.*

I was asked last February, by a medical friend of mine, to see with him the wife of another medical man whom he was attending. She had had excellent health up to ten days before, and had certainly never suffered from undue shortness of breath, or shown any signs of cardiac disease. At the time referred to, she was lifting a heavy box, when suddenly and quite without warning she experienced a sense of distress in the region of the heart, accompanied with faintness and oppression or difficulty of breathing. Since that time the attacks, lasting individually from a few seconds to a few minutes, have been of frequent occurrence, especially in bed. In bed, indeed, their constant and rapid recurrence has kept her awake all night. It was observed by her husband that during them her pulse was extremely irregular, and it seemed to him that (judging by the pulse at the wrist) the cardiac intermissions were frequently of several seconds duration. I received this history (which was subsequently confirmed) as my friend and myself were driving to the patient's house, and suggested to him that most probably these intervals of apparent inaction of the heart were really periods during which the heart was beating with extreme rapidity, though also with extreme feebleness. When I saw her she struck me as a well-nourished, healthy-looking woman; she had no difficulty of breathing, and was not in any physical distress. Her lungs were healthy and resonant. The præcordial dulness was of normal dimensions, and the heart's apex in the usual situation. Its sounds were healthy, save for the presence of a slight and soft systolic murmur in the aortic area; there was no evidence whatever of dilatation or enlargement of the heart; or (excepting the murmur) of any disease either in the valves or in the large vessels. There was no anasarca, and the urine was free from albumen; the pulse was regular, and about 100 in the minute. But during my interview with her, periods of regularity and comparative slowness of cardiac action alternated frequently with attacks (varying in length between 5 and 20 seconds) of marked irregularity. These generally began with one or two powerful beats, which were followed by beats at the rate of

between 200 and 250 in the minute. No pulse was perceptible at the wrist while the heart was acting thus rapidly. She had no pain at these times, but complained of a feeling of much distress. I saw the lady again at the end of April, and learnt that she had improved since I saw her, that for two or three weeks, while she was at the seaside, she had been almost entirely free from palpitation, and in her ordinary good health, but that during the last week or two (since her return to town) the attacks of palpitation had recurred. She had been taking liquor arsenicalis, but not iron or digitalis. She was at her best when I visited her, felt and looked well, was free from anasarca, had no dyspnoea, and the cardiac murmur, which I had recognised on the previous occasion, had disappeared. She had noticed latterly (as she had done before) that the palpitation came on chiefly at night time, and when lying down; and she lay on the bed while I was with her, in order to bring it on. But only two or three slight attacks of irregularity, lasting for a second or two at a time, occurred. She stated that when lying down she could arrest or prevent the palpitation by placing a cushion or pad under the loins, so arranged as to cause the back to be strongly arched backwards.

A case also, which I evidently formerly misinterpreted, has recently come under my observation in consultation with Dr. Clothier:

CASE IX.—*Paroxysmal Hurry of Heart of Fourteen Years' Duration—
Death mainly from Bronchitis.*

This patient was an elderly lady living in Wales, whom I had known for 17 or 18 years. She had come up to London on a visit in the latter part of April of the present year. She was then in her usual state of health; but after a fortnight she seems to have caught cold, and to have contracted a sharp attack of bronchitis. I was asked to see her on the tenth day. At that time she was very ill, had much dyspnoea (her respirations were at the rate of 40 in the minute), had a frequent cough without much expectoration, and presented very slight anasarca. The urine was free from albumen. Her chest was resonant, but there was some crepitation at the bases. The cardiac pulsations were irregular, and 224 in the minute, the sounds being free from murmur, and the organ (so far as I could make out) of normal size. The pulse at the wrist was imperceptible. Her temperature was normal, and she was quite sensible. The case went on badly, and she died three days later of a combination of asphyxia and debility.

Between 14 and 15 years ago I was staying at her house in Wales, and was called up at night on one or two occasions, when she appeared to be suffering from what I then supposed to be angina-like attacks, and was, I thought, in great immediate danger. The heart was acting rapidly and irregularly, and I believed that she had serious organic cardiac disease. She recovered from these attacks; and I do not know (although I saw her on the average every year or two) that I ever examined her heart again. I heard, however, that she still suffered, from time to time, from similar attacks to those in which I attended her. But nevertheless she maintained fairly good health, and I was surprised to observe, year after year, that there was no aggravation of her cardiac symptoms. I saw her a little more than three years ago, and she then seemed well and cheerful.

I have no doubt, guided by my last examination of her, that her case from the beginning was a typical one of functional hurry of the heart, and that there never was any organic disease of that organ. Whether she would have died of her bronchitic attack, if her heart had been functionally healthy, may be questioned.

1. The cases just narrated possibly admit of arrangement in several categories. Thus, in some, the action of the heart was only extremely rapid; in some, it was rapid and also irregular; in most, the attacks of palpitation were paroxysmal; and in some the palpitation appeared to be persistent. Undoubtedly the most striking cases (and these first attracted my attention) were those in which phenomenal hurry of the heart, without obvious irregularity, occurred habitually in paroxysms of varying duration, in persons who were apparently in other respects healthy. A wider experience, however, has satisfied me that there is no essential distinction between the cases characterised by simple rapid cardiac action, and those in which rapidity and irregularity are combined, and that, although the tendency to intermission or remission of attacks is a common feature of the disease, the palpitation is always liable, sooner or later, to become indefinitely prolonged.

In those cases in which the palpitation occurs in paroxysms these come on for the most part without warning, and often without obvious cause, last individually from a few minutes to several hours, or in some instances for several weeks or months, and usually end as suddenly as they began. The

intermissions are equally variable in duration, and, especially early in the disease, may be continued for many months.

In speaking of the rapid cardiac action as being in some cases regular, in others irregular, I have to confess that I use these terms relatively only. In the former class the cardiac pulse during the paroxysms may vary, roughly speaking, from 180 to 300 in the minute, even in the same case; but the changes from one rate to another are sudden, and the persistence of any one rate of beat is relatively considerable. In the other class, the cardiac pulsation is characteristically irregular; that is, small groups of slow and strong beats alternate with small groups of rapid and feeble beats, each group lasting between, say, one and ten seconds. The difference between the two cases is very obvious as a clinical fact, but the irregular pulse is apt at times to become regular, and by simple shortening of the duration of the successive rates of beat, it is clear that what seems a regular pulse would become irregular.

In all cases, as might be supposed, the pulse at the wrist is extremely feeble; and even in cases where the action of the heart seems regular, the regularity usually does not extend to the radial pulse. Indeed, when the heart is acting irregularly, the pulse at the wrist is often imperceptible for many seconds together, so that without examination of the heart it might be assumed that this was motionless during the whole of the time. In fact this disappearance of the radial pulse in the intervals between groups of stronger beats not unfrequently misleads the practitioner in this sense.

2. On what the undue rapidity of the action of the heart in such cases as I have narrated is primarily dependent, is very obscure. In most of my cases no definite cause for the commencement of the disorder could be discovered; and in those cases in which a cause was assigned, it was really doubtful if the apparent cause had anything to do with the matter. In Case VIII. the palpitation seems certainly to have been induced suddenly by over-exertion, and in Case VII. there is good reason to believe that the malady dated from an attack of cardiac distress brought on by running. In my 4th case there is no history of violent muscular exertion, but the palpitation first showed itself at a time when the patient had

much continuous work and responsibility. In another instance, Case V., the symptoms appear to have dated from what was said to be a sunstroke—an attack, the real nature of which is doubtful. In Case VI. there was a definite history of syphilis. On the whole, I am inclined to think that the evidence (such as it is) points to the origin of the malady in either mental or bodily over-exertion.

3. The question naturally suggests itself, as to whether these cases have any relation to hysteria on the one hand, or to exophthalmos on the other. In answer to the first question I may point out that most of my quoted cases, and, I may add, most of the other cases I have met with but have not thought it worth while to record, were in men; and that few, if any, even of the women presented any hysterical history, or manifested characteristic hysterical symptoms. As to the second question, I may observe that although extremely rapid action of the heart is one of the usual phenomena of exophthalmos, I have rarely or never observed such rapid action in that disease as has characterised the cases brought together in this paper, nor have I noticed in it the alternations between excited and normal pulsation which was the striking feature of so many of them. At the same time it is noteworthy that in Case III., in which the cardiac pulsations rose to 240 in the minute, there was actually a goitre. There was no additional evidence, however, of exophthalmos in her case; and I have reason to suspect that the association of the goitre with the palpitation was accidental.

4. One of the most remarkable facts in the history of cases of inordinately rapid action of the heart is the capability which many of the patients manifest of taking active exercise, and of doing their ordinary business even when the palpitation is upon them, and the little distress which the palpitation causes. This was noticeable even in the case of my first patient, who was kept in bed, and at rest, not because she felt ill or incapable of exertion, but because the medical man ordered it. Mr. S. (Case V.) was going about apparently well, and assured me that shortly before I saw him he had (although 65 years of age) run three miles in twenty minutes without suffering. Mr. C. also (Case VI.) not only went about his daily business,

but enjoyed a trip in Switzerland. The most remarkable example, however, of this phenomenon was Miss J., who up to the time at which her cardiac affection induced dropsy and other symptoms of cardiac incompetence, lived during her attacks as she was accustomed to live when she was free from them, walked and did important official work daily, and even travelled to various parts of the country in pursuance of her duties as a Government inspector.

No doubt in all cases my patients suffered more or less from symptoms referable to the heart, and in some the symptoms were distressing and serious. They were mainly an uneasy feeling with a sense of fluttering in the præcordial region, shortness of breath, especially on exertion, and faintness; and, associated therewith, more or less dusiness or lividity. Angina-like attacks occurred in one instance. One or two patients complained chiefly of a feeling of restlessness. And one (Case VI.), who always gave a very clear and graphic account of her condition, remarked over and over again that when the palpitation was on her she always felt irritable and in a hurry, and as though she must do two or three times as much work in a given time as usual. She, moreover, stated that she always experienced much distress at the onset of her attacks; but that this wore off in great measure after a short time, and that the sense of hurry and of fluttering in the region of the heart alone survived.

5. On the whole the results of my cases have not been satisfactory, and judging from them alone the prognosis of such cases is certainly not hopeful. In one or two the disease is still in an early stage, and what the event will be remains to learn. In two or three the disease has lasted for some years; and the attacks have shown a tendency to increase in frequency and duration. But I am sorry to say that, in large proportion, my cases have already proved fatal.

So far as I know, Cases I. and V. are still in progress; and the 8th case is up to the present time doing well, though not cured. Case III. was fatal, but it is possible that this was not a true example of the condition under consideration; and the 2nd case was also fatal, but the patient was suffering from advanced organic heart disease, with probably an aortic

aneurism, and his death may be fairly attributed to one or other of these lesions. All my other quoted cases have died. Miss J. (Case IV.) died of her disease after it had continued for fifteen or sixteen years. Mr. C. (Case VI.) died quite recently, having been liable to palpitation for about eight years. Mrs. J. (Case IX.) also died very lately, after suffering for fourteen or fifteen years. And A. W. (Case VII.) also died, probably at the end of about eleven years after the first symptoms of disease showed themselves.

Miss J. died with the ordinary symptoms of obstructive heart disease (namely, general anasarca, pulmonary apoplexy, and congestion of the liver and kidneys), which showed themselves for the first time about five weeks before her death, and were apparently induced by overwork at a time when her heart was acting rapidly. Mr. C.'s death was brought on in much the same way. His fatal symptoms, which included general anasarca, hydro-thorax (for which he was tapped twice), congestion of liver and kidneys, lividity and orthopnoea, appeared only about three weeks before he died. Williams died suddenly at a time when, so far as his feelings and appearance were concerned, he seemed to be perfectly healthy. Mrs. J. succumbed to what appeared to be a not very severe attack of bronchitis, the effects of which were obviously aggravated by the weakness of her heart.

Speaking generally of these cases of recurrent palpitation, I should be inclined to say, that the prognosis is fairly hopeful for those persons who are able to lead quiet lives, who avoid mental or bodily excitement and overwork, who protect themselves from catarrhal and other disorders likely to interfere directly or indirectly with the equilibrium of their circulatory organs, and who nurse themselves with care during their attacks of palpitation. And I am disposed to think that, in many such cases, the progress of the affection may be arrested. I base this opinion partly on the apparently complete restoration of such patients to health in the intervals between their attacks, partly on the long duration of some of their cases without the development of any serious cardiac and other complication, and partly on the circumstances of their fatal attacks when these at length happen to supervene. But it is

obvious that patients thus affected run many and continuous risks, and that death, either from a sudden faint or from the coming on of symptoms of cardiac incompetence or obstruction, is always imminent.

6. What the condition of the heart is in these cases is a matter of considerable interest. That such attacks of palpitation as I have described may be associated with organic heart disease is obvious, from the history of my second case, in which the patient was suffering from advanced aortic regurgitation combined with hypertrophy and dilatation of the left ventricle; and from a case now under my care in which the palpitation, coming on for the first time three or four months ago, is associated with the presence of a *præsystolic* apex murmur, referable apparently to the effects of an attack of acute rheumatism which occurred more than fifteen years ago. But in most of the cases I have seen there has been nothing to show that the heart was structurally affected; there has been no murmur, there has been no accentuation of the second sound at the left base, and the apex has impinged at the usual spot, or so near as it shows that there can have been little if any real change in bulk. In the only fatal case in which I have obtained a post-mortem examination, the heart was somewhat hypertrophied and dilated, but the valves were absolutely healthy, and so also was the muscular tissue. In this case a systolic apex murmur was recognised during life, when the heart was beating slowly, and appears to have been due (as was suspected during life) to the mitral valve allowing of regurgitation in consequence of the ventricular dilatation.

My belief is that the affection has no special connection with cardiac disease, and that dilatation and hypertrophy (when they occur in it independently of valvular mischief) are the slowly developed consequence, and not the cause, of the functional disturbance.

In connection with this subject of the condition of the heart, it is noticeable that during the attacks of palpitation the cardiac pulsations are visible over the whole præcordial region, and that there is visible throbbing in the large arteries of the neck. It might be hastily assumed that this extensive and apparently violent pulsation implied undue force of cardiac

action. But that this is not so is obvious, both from the extraordinary feebleness of the pulse at the wrist, and from the very small amount of blood which is pumped at each ventricular systole into the arteries. The explanation is probably that the cavities of the heart are full of blood, and that the contractions of the ventricles are imperfect, so that only a small proportion of their actual contents is expelled at each systole. For if partial contraction occurs in a full but flabby and elastic-walled cavity, as the heart under such circumstances may be assumed to be, it is clear that the contraction in one part or zone must be attended with a general rise of pressure in, and consequent dilatation of, every other part, in which also there would be general synchronous pulsation. I believe, from having carefully examined several of these cases, that the apex beat and its impulse over the cardiac area are actually synchronous; whereas if, as one sometimes witnesses, and especially in cases of aneurism of the ascending arch, the pulsations of the surface of the ventricles and of the apex in a healthily acting heart are visible, they are distinctly alternate in rhythm.

7. As to the real nature of the disease which my paper is intended to illustrate, I have little to say. My belief is, as will doubtless have been gathered from all that precedes, that so far as the heart is concerned it is a purely functional disorder. that any actual cardiac disease which may be present in any case must be regarded as accidental, and that the slight hypertrophy and dilatation of the heart which may be found in patients who have suffered from the malady for years are (as I have already remarked) the consequence, and not the cause, of the palpitation.

8. I have also little to say under the head of treatment. In one or two cases during the attacks of palpitation, I have found digitalis, or digitalis combined with iron, of exceeding value; but in others these drugs have had no beneficial effect whatever. Digitalis and strophanthus, however, are remedies which would naturally suggest themselves, and are always worth a trial. If symptoms of obstructive cardiac disease become developed, as I have shown they are likely to do sooner or later, of course the ordinary treatment for such symptoms should be carried out. The little apparent suffering which

many patients experience during their attacks permits and encourages them at such times to go about their ordinary work and even to undergo considerable mental and bodily exertion. It is clear, however, that all such labours are detrimental, and attended with danger; and that the patients should be kept at rest. When one considers the tendency there is in these cases for their malady to become more and more grave and intractable as time goes on, the importance of treating them in the intervals between the attacks, and especially in the earlier stages, becomes obvious. I am not prepared to recommend at such times the employment of any particular drug, but it seems to me that our aim should be to maintain the patient's general health, to prevent as far as possible undue mental or emotional exertions, or severe muscular strain, or continuous mental or bodily hard work, and to treat with special care every attack of palpitation.