a difference in the properties of the principle itself, or whether to the manner in which it is held by other matter, I am not yet in a position to decide. The Bernardin of the liver, as I have shown, is readily extracted with water at 300° F., whilst, according to the experiments I have conducted, that of the blood is not similarly susceptible of removal.

I have not yet said anything about the structures of the body generally in relation to Bernardin. I have subjected the spleen, pancreas, kidney, brain, and muscle to the same kind of examination as I have adopted in the case of the blood, and have found in all a notable amount of Bernardin.

Muscle has long been known to contain Bernardin (glycogen), but the quantity I obtain by the potash process is decidedly greater than what, I believe, is generally thought to be present. From cat's muscle, in one of my observations, the analysis yielded upwards of 5 per 1000. Horse's muscle has been known to be specially characteristic as containing Bernardin, and 9 per 1000 in one instance is the quantity I have obtained.

In the observations I have yet made upon the spleen, pancreas, kidney, and brain, the largest amount of Bernardin has been found in the spleen, and in one instance the quantity indicated was a little under 4 per 1000.

Bernardin therefore has been found as a constituent of all the tissues I have up to the present examined. I have likewise obtained it in notable amount from both the white and yolk of egg.

Besides Bernardin, there is in the several tissues I have referred to a cupric oxide reducing substance, which is susceptible of extraction by alcohol, and this also is present to a somewhat notable extent. In the case of the spleen, pancreas, kidney, and brain, this body appears to be glucose, the reducing power in most of the instances having come out about the same before and after the treatment with sulphuric acid and heat. In the case of muscle, however, the reducing power has been usually observed to be about twice as great after the treatment with sulphuric acid and heat as before. It seems, therefore, that we have here a body of the nature of maltose, instead of glucose, to deal with.

Although I have a considerable number of observations before me, yet I consider it advisable at present only to speak in the general way that I have done upon this subject. Observations conducted under varied physiological conditions require to be undertaken, so that besides having the facts as mere chemical facts before us, we may be in a position also to deal with them from a physiological point of view. In a subsequent communication I will enter further into this matter, and then supply details of the actual quantitative results.

Summary of Conclusions.

Bernardin (glycogen) does not undergo any significant transformation into sugar in contact with blood.

Bernardin exists to a distinctly notable extent as a normal constituent of blood.

The evidence derivable from the observations recorded on the addition of Bernardin to blood and its subsequent recovery, and on its extraction from the liver by boiling water on successive days, and by water at 300° F., tends to show that Bernardin enters into feeble combination with nitrogenous matter.

Bernardin exists in notable amount, not only in muscle, as has been previously known, but also in the spleen, pancreas, kidney, and brain. These are all the structures I have yet examined. It also exists in notable amount in the white and yolk of egg. These several products likewise contain a cupric oxide reducing substance, which is extracted by alcohol, and which in most instances possesses the characters of glucose, but specially in the case of muscle the characters of maltose.

Through the existence of Bernardin (glycogen) throughout the system, as has been represented, we have a carbohydrate occupying a parallel position to albumen—viz., existing in the colloidal state, and thus adapted for retention within the body, instead of passing off as a diffusible substance like glucose tends to do.

Grosvenor-street, W.

ASYNCHRONISM OF THE TWO SIDES OF THE HEART.

By PHILIP BINDLEY, M.B. LOND.,

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A DOUBLE apex beat with only a single arterial impulse is one of the numerous forms of cardiac irregularity which are observed clinically. With the stethoscope three classes of this abnormality can be recognised. One in which a natural beat is succeeded by a confusion, which amounts to scarcely more than a sensation of an attempt at contraction. A second in which the natural beat is followed by an obvious contraction, with a first sound, but no second sound. A third, where one beat, with clear first and second sounds and arterial impulse, is followed by another of similar character as regards the sounds, but without an arterial impulse. The ensuing case illustrates this last form.

C. W.—, aged twenty-two, single, housemaid, well nourished, complained of general lassitude, indigestion, palpitation, and shortness of breath on slight exertion, which symptoms had been coming on for some months. She says she had rheumatic fever twelve months ago, but from the history of this illness it is clear that the attack was only a very mild one, even if it were of a rheumatic nature at all. Conjunctivæ and palate pallid, but the countenance showed little evidence of anæmia. Venous hum in right side of neck. Faint systolic murmur over apex, and at second left intercostal space, where it is rather louder. Heart's action irregular and intermittent. Rest and ten-minim doses of tincture of belladonna three times a day for three weeks afforded much relief, and she resumed her duties as housemaid.

A month later she was much worse, the palpitation and shortness of breath having returned with increased severity; but the conjunctivæ and palate were no longer anæmic, and the cardiac murmur had quite disappeared. Same treatment as before, and ordered to keep in bed for a few days. During these few days the chest was repeatedly and carefully examined. Lungs healthy; superficial area of cardiac dulness normal. The condition of the heart, as revealed by palpation and auscultation, was unusual and peculiar. Over the apex there was a double beat, the first element of which had its point of maximum intensity at the outer margin of the area of impulse, and seemed to come up to the chest-wall from a short distance within. Almost immediately the sensation of this beat had ended the second element began, and appeared to start out of and from the spot where the first was best felt, and slide on, upwards and inwards, beneath the finger, at the same time communicating a distinct stroke—in fact, more distinct than that of the first element. At a spot an inch inside the left mammary line in the fifth space it was possible, with the end of one finger, to perceive the characteristics of both beats. If the end of the finger were shifted a little outwards the first of the two strokes became more evident; if shifted a little inwards the second was more prominently felt, while the force of the first was diminished. The two beats were followed by a pause of longer duration than the time between the beginnings of the two beats. The pulsation in the carotid was synchronous with the first element; with the second there was no trace of a carotid pulse.

In the second left intercostal space, three-quarters of an inch from the edge of the sternum, and close to the upper border of the third rib, there was an obvious beat; in the third space a similar pulsation was to be felt, but less distinctly. These two pulsations were synchronous with the second apex beat. The radial pulse was 62 in the minute.

Although at first a jumble of sounds seemed to be conveyed to the ear by the stethoscope, if a finger were at the same time placed on the carotid it was not difficult to analyse the mixture, and recognise which of the sounds indicated the closure of the mitral valve. With this known factor to start from, the following sequence and rhythm were determinate, the irregularity recurring in a regular manner—

1....21'....2'.....1....21'....2'.....1... &c. &c.

The figures represent the first and second sounds respectively, and the dotted lines indicate the relative length of the intervals between the sounds. The figure 1, syn-

BEQUESTS AND DONATIONS TO MEDICAL CHARITIES.

Mr. Wm. Miles, late of Exeter, bequeathed £200 to the Exeter Lying-in Charity. By the will of Mr. Geo. Marples, the Sheffield General Infirmary and the Sheffield Public Hospital and Dispensary become each entitled to £500, and the Sheffield Hospital for Women to £300.

chronous with the carotid impulse, signifies the mitral closure; 2, the aortic; 1', the tricuspid (which followed immediately upon the aortic); 2', the pulmonary. None of the sounds were loud, but were of a perfectly pure character. There was no murmur. The relation of the sounds to the double beat was equally plain—1 corresponding to the first beat, and 1' to the second. The basic beat in the second space was synchronous with 1'. After this irregularity had continued for some little time, the heart would give a kind of tumble, and at once begin to act in a perfectly normal and regular manner; the pulse, however, instead of being only about 60, at the same moment rose to between 80 and 90. Any exertion, such as walking up and down the room for a minute or two, caused a repetition of the irregular action.

In order to obtain an unequivocal record tracings were taken with a cardiograph. By means of this the facts are made to register themselves. Three levers were supported by an arm and brought to bear upon the revolving drum; great care was taken that they worked parallel and that their points travelled in the same vertical line. One lever recorded the impulse of the carotid (*c*)—see figure¹—another the basic

impulse (*b*), and the third the apex beat, its duplicate character being shown in the tracing; *l*, left ventricle, indicates the first element in the apex beat; *r*, right ventricle, the second element. The tracings to be read from right to left.

This graphic representation demonstrates that the carotid impulse is synchronous with the first apex beat, and that the contracting left ventricle is the cause of this beat. It proves that the basic impulse is synchronous with the second apex beat, and that this beat is not due to the left ventricle, inasmuch as there is with it no arterial impulse. But this second beat was accompanied by a first sound, and followed by a second sound; and, further, it was not merely a slight contraction, perhaps only just sufficient to lift the semilunar valves, but a sustained contraction, equal in length to that of the left ventricle, and succeeded after a corresponding interval by a second sound as distinct, although not quite so loud, as that produced in the aorta. Therefore this second sound must have been created in the pulmonary artery, and the second apex beat due to the contracting right ventricle. Palpation alone, or palpation and auscultation combined, lead to the same conclusion.

Some observers deny that the two sides of the heart can beat separately. This is not the only case where it has been observed, but it is selected because the attempt to record graphically the basic beat in conjunction with the carotid and double apex beat was successful. It is unfortunate that the hæmic murmur observed when the patient was first seen disappeared, for had it persisted during the irregularity the determination of its locality—whether pulmonary or mitral—would have been rendered manifest. The left auricle can have had nothing to do with the production of the basic impulse. This must have been caused by either the root of the pulmonary artery or the impact of the conus arteriosus against the intercostal space. The question of basic impulse and some other subjects it is proposed to discuss in a future communication.

New Bond-street, W.

¹ The tracings have been much reduced in size to suit THE LANCET column.

THE BEGINNING, MIDDLE, AND END OF A STONE IN THE URINARY PASSAGES; LITHOLAPAXY.

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A. B—, a clergyman, aged thirty-eight years, of good but delicate constitution, studious habits, temperate, free from hereditary tendency to gout or lithic diathesis. Tendency to constipation strong from youth. In the spring of 1877 he had a violent attack of griping pain in the region of the right kidney and in front opposite the junction of the ascending and transverse colon. The attack was not a very long one, and was relieved by domestic remedies without the aid of a physician. A similar attack occurred during the summer of the same year, while the patient was in the mountains at a distance from Beyrout. A native physician was consulted, and prescribed turpentine stupes to the seat of pain. This attack was also less severe than subsequent ones. During the spring of 1878 there occurred several of these attacks, more severe than the preceding. The nature of the attacks was as follows. After more than usually obstinate constipation the patient was seized with agonising pain in the before-mentioned regions, accompanied by nausea and vomiting. There was marked tenderness over the kidney, but not over the angle of the colon. Hot fomentations, sinapisms, flax-seed poultices, and warm drinks gave little or no relief. Full hypodermic injections of morphia were effectual in mitigating the pain, which did not generally disappear until the following day, after the operation of a saline cathartic. During several of these attacks there was considerable febrile excitement, but never any inflammation of the kidneys. During the earlier attacks the pain was localised in the region of the kidney and upper part of the right hypochondrium, but late in the spring of 1878 the patient began to feel pain along the course of the right ureter, and to complain of retraction of the corresponding testicle, and pain in the glans penis. Periods of several months sometimes passed without any attacks. In the early part of the summer of 1878 he experienced a very severe paroxysm, but no other supervened until late in the autumn of the same year. In the meantime he had taken a trip of eleven days of rough riding over the highest peaks of Lebanon, with no unpleasant results. In the summer of 1879, after several of these attacks, I advised him to take a journey to Europe, and to use the antilithic waters of Carlsbad or Kissingen. He had several attacks during the journey to the last-named watering-place, where he spent a month, using the waters and conforming to the prescribed regimen under medical advice. The result was a cure of the constipation and a great improvement of his general health. On his return journey, however, while at Marseilles, he had a severe paroxysm of pain, unaccompanied by the former constipation of the bowels, after which he had no further attacks. The date of the last attack was near the end of September, 1879. From that time until the spring of 1880 he was in excellent health, suffering no pain, free from constitutional disturbance, and he supposed himself quite cured.

Although the symptoms up to the date of the last paroxysm had led to a strong suspicion of the passage of a kidney stone, the diagnosis was not quite clear. The attacks were in every instance but one preceded and accompanied by constipation, and only yielded fully when the constipation was overcome by a cathartic. The paroxysms were not brought on by muscular exertion or jars. On the contrary, his health improved, and he was long free from pain after a long and fatiguing journey on horseback. The urine was not lessened in quantity nor rendered turbid during these exacerbations. During the latter part of the spring of 1880, more than six months after the attack of pain in Marseilles, he began to suffer from symptoms of vesical irritation, with increasing cloudiness of the urine. These symptoms were aggravated by the slightest imprudence in diet, especially by the use of fruit and pastry. During the summer he had occasionally a sensation of a slight stoppage of the urine. I sounded the bladder, but did not detect a stone. The passage of the instrument, however, gave immediate and marked relief to all the symptoms. These recurred, however, after a few

DEVONSHIRE HOSPITAL AND BUXTON BATH CHARITY.—At the meeting of the Committee of Management, held on July 2nd, Dr. Robertson, the chairman, was able to announce the near completion of the extension works of the hospital. It will be recollected that at this institution the system of issuing post-cards to patients on leaving the hospital, on the understanding that the cards be returned with a statement of the progress of the convalescence or other result written on them, is in vogue. The system seems to have been fairly successful. Of 249 returns thus made, 181 report improvement, 67 no amelioration, and 1 a fatal issue.