PROVINCIAL MEDICAL & SURGICAL JOURNAL.

A COURSE OF LECTURES ON CLINICAL MEDICINE.

By W. R. BASHAM, M.D., Physician to the Westminster
Hospital.

LECTURE X.

Case of Hypertrophy of the Heart with Dilatation: the accompanying symptoms illustrative of this form of cardiac disease; cough; dyspnœa; peculiar and special form of expectoration; anasarca and general dropsy: stethoscopic signs.—Hepatic derangement; state of the excretions; condition of the urine albuminous; deficient in urea; analysis of the blood, detection of urea in.—General indications of treatment; advantages of venesection.—Singular character of matter vomited from the stomach; the Sarcina ventriculi, of Goodsir, observed in the yeasty mass ejected from the stomach.

Gentlemen,—The case to which I wish to engage your attention to-day, is one that I have had frequent opportunities of making passing observations upon during our visits to the wards; but as it has presented many symptoms of complication and difficulty to the student in clinical medicine, I propose to take a general review of the symptoms as recorded in the ward-book, and to give you such explanations as may be necessary to interpret either its pathology or treatment.

G. F—, aged 38, carpenter, has been addicted to drinking; his general health has been good till within the last five weeks. He was admitted into Burdett ward on December 24th, and was then suffering from frequent urgent dyspnœa, with suffocative cough, and copious expectoration, of a very dirty-coloured, glutinous, jelly-like fluid. He states that his health began to give way about five weeks since, first complaining of severe attacks of gastrodynia and tenderness at epigastrium, augmented after eating; cough and dyspnœa followed, and then the legs began to swell, and he noticed that the face became puffed and œdematous in the morning. There was, on admission, general anasarca, the scrotum being distended with fluid; face œdematous, especially in the morning; aspect of the patient not unhealthy, as there is a remarkable injection of the vessels of the cheeks, which gives a florid appearance of health; the conjunctiva has a slight icteritic hue; the surface of the chest is œdematous, the stethoscope leaving an impression by its pressure. The chest is equally resonant throughout; no dulness in the præcordial region; vesicular murmur not clearly heard; bronchial respiration in each region, with deep mucous

gurgling of large bubbles; impulse of the heart much increased, the head being sensibly raised by the upheaved stethoscope; the systolic murmur is not prolonged, but the diastolic sound is confounded somewhat with it, it is not clear and distinct; the pulse is sharp and full, regular and equal on both sides; no pulsation noticed in the neck; the cough is frequent; sputa muco-glutinous, and stained by the hæmaphœin of the blood; some slight tenderness on pressure in the lumbar region of the kidneys; the liver appears to occupy a larger space than usual, but there is no tenderness in the right hypochondriac region. He was cupped over the region of the heart, and directed to take the blue pill, in three-grain doses, night and morning, with infusion of diosma and tincture of digitalis.

During the next twenty-four hours the anasarca sensibly diminished, but the heart's action continuing very violent and impetuous, it was thought desirable to take blood from the arm to sixteen ounces. The blood drawn did not separate into its constituent portions of coagulum and serum, but remained a firm uniform coherent red clot, easily broken up, but which did not yield up any serous fluid on being so disturbed. The urine was this day examined. He passed not more than a pint in the twenty-four hours; it was cloudy, of an orange-brown colour, with numerous flocculi appearing in it, faintly acid, cleared by heat, with copious evolution of gas-bubbles; on reaching the boiling point it again became cloudy, and on the addition of nitric acid, a flaky albuminous deposit in minute quantity, was thrown down. Microscopically examined, amorphous urate of ammonia, with considerable amount of epithelial matter, was observed. As he obtained no sleep, being much disturbed by the cough, he was ordered Extr. Conii, gr. x., hora somni.

The impulse from the heart continuing but little diminished, and the pulse being still full and sharp, it was thought desirable on the 31st to take a farther quantity of blood from the arm, and eight ounces were abstracted; and now the separation into serum and clot took place, but there was no separation of the red particles from the fibrin. The effect of this bleeding was most beneficial upon the secreting organs; the kidneys now formed two pints and half of urine in the twenty-four hours, of a lighter colour and clearer, with less deposit of urates. The fæces became of a brighter bilious hue, and the expectoration was more copious and easier of excretion, but still presented a dirty hue, the colouring matter of the blood being still

dissolved in it. The anasarca condition of the system had much diminished; there was much less œdema of the chest; no swelling of the scrotum; and scarcely any of the lower extremities. On the 2nd of January, the quantity of urine excreted is stated as three pints; natural in colour and general appearance; no indication of albumen; normal amount of uric acid; tongue clean; pulse, however, still continued full, sharp, cordy, and jerking. Up to this period the patient had been confined to a fish diet, carefully avoiding all stimuli. The mercurials were repeated only at intervals; digitalis being solely trusted to bring down the impetuosity of the heart's action after the *plenitudo ad molem* had been to a certain extent relieved by venesection.

The report of the 4th of January states that the urine had again diminished to a pint and a half, of a brown orange colour, and much loaded with urates. The heart's impulse still continues augmented; sounds somewhat obscure; an aortic bruit accompanies the systolic murmur, increased and becoming more distinct as the stethoscope is raised to the position of the arch of the aorta. On the 6th of January the urine became again highly loaded with urates; albumen in small quantity still present; bowels continue to act freely, but the dejections are offensive and dark coloured; pulse 120, full and incompressible; cough frequent and distressing; sputa as before, but without any trace of blood; heart's impulse much increased; action impetuous. Blood was again taken from the arm to eight ounces, a portion of which was analysed by the following process, to ascertain if urea existed in the blood. As soon as drawn, three ounces were agitated well with pure alcohol, and allowed to stand at rest for four hours; the mass was then filtered, and the residue on the filter again treated with alcohol, and the solution filtered. An orange-coloured alcoholic solution was obtained, which was evaporated to dryness in the water bath, after three fourths of the alcohol had been recovered by distillation at a low temperature. The dry residue had a yellow orange colour, and a faint crystalline appearance; a few drops of distilled water were added, and then a small quantity of pure nitric acid; on setting this aside in a watch-glass in a cool place, after an hour's rest, crystals of the nitrate of urea were distinguished with the half-inch glass, under the microscope.

It was now thought advisable to allow the system to rest for a time without any interference by medicinal agents, for the last abstraction of blood had materially relieved the more urgent symptoms; the heart's impulse was diminished; the pulse was reduced to 90, softer in character; and the cough was less frequent, and the expectoration free from hæmaphæin and more purely mucous in its appearance. The urine, though still high in specific gravity, (1.021), was clear, yet dark coloured. No urea could be detected, and the presence of albumen was still indicated by the ordinary re-agents.

On the 9th of January a great improvement became manifest. The anasarca condition of the surface had disappeared, and the legs only became œdematous towards night, and after he had walked much about the ward; the pulse, however, had become unnaturally

frequent, 120, but had lost its jerking character, and the general appearance of the patient was that of a healthy man, from the before-noticed state of the capillaries of the cheeks. The sputa had become much diminished in quantity, and frothy, and colourless, presenting only a few masses of yellow mucus. He was now placed upon an improved diet, three ounces of meat for dinner, with extra bread allowance. Two days after, however, the symptoms again retrograded. The œdematous condition of the legs, scrotum, and entire surface, even of the cheeks, again returned. The urine two pints daily, of a dark orange-colour, with copious deposit; bowels open, dejections natural; appetite craving; pulse 110, full and tumultuous.

The symptoms continued without any material alteration to the 21st of January. During this interval he had taken nitric acid, and subsequently for a few days, quinine, but without any change for the better. On the 21st, after breakfast, he was seized with nausea and vomiting of a peculiar yeasty-looking fluid. The urine during the last few days had become very dark coloured, of a specific gravity of 1.022, and the amount of albumen had very much increased. At the afternoon visit on this day, a rough murmur was heard continuous with the systolic sound, and much obscured by the moist mucous crepitation, heard more particularly in the mammary region of each side. A good deal of restlessness occurred, and morphia was administered at night.

On the 22nd, vomiting again occurred, of the same frothy yeasty fluid. This, when examined by the microscope, presented many fat globules, epithelial scales in abundance, frequent tufts of margaric acid, and several beautiful specimens of the *Sarcina ventriculi* of Goodsir. Ammoniated draughts, in a state of effervescence, with citric acid, were given; and arrow-root, and small quantities of wine, with morphia at night. The ammoniated draught seemed to check the vomiting, for it did not return after the first two doses. During the next three days the œdematous state increased; the heart's action increased in tumultuous impetuosity; the sounds in the præcordial region became muffled; the cough and dyspnœa returned in frequency and urgency; the urine diminished in quantity; the bowels were freely moved; the appetite craving; no thirst, no vomiting. The dyspnœa became more urgent on the afternoon of the 26th of January, and in the evening of that day he died.

Sectio Cadaveris twenty-four hours after death.—The whole surface of the body was anasarca, the subcutaneous tissues being much infiltrated with clear serum; some also was present in the abdominal cavity. Firm adhesions between the pleural surfaces. The bronchial glands situated at the fork of the division of the bronchi were very much enlarged, as were also those which lay beneath, and followed the direction of the left bronchus. The mucous membrane of the trachea was finely injected, and of a bright red colour, but at the bifurcation this colour had become of a dusky brown, with marked evidence of passive venous hyperæmia; all the tubes were filled with a tenacious fawn-coloured mucus. The heart was very much enlarged, its cavities dilated, and its walls thickened;

it weighed after being cleaned seventeen and a half ounces; the tricuspid valve was opaque and thickened at its edges; the semilunar valves of the pulmonary artery were natural; the aortic valves, however, were rigid, and stood out pouch-like from the parietes of the vessel, and their edges thickened and covered with wart-like fibrinous growths. The aorta for five inches in its extent, was covered with a semi-cartilaginous deposit that presented the walls as wrinkled or corrugated, and with evident enlargement of its capacity by dilatation. The liver on the superior surface of the right lobe presented a copious exudation of plastic lymph, causing firm adhesion to the diaphragm; the substance of the organ was highly granular, and exhibited the features of incipient cirrhosis, the appearance being myristicate,—a purplish veining, surrounding isolated yellow granules. The organ weighed fifty-nine ounces. The kidneys were not enlarged; the right weighed four ounces and three quarters, the left five ounces. The tubuli uriniferi were clearly marked out by a deep purple injection, and the cortical part was granular, plainly demonstrated when the peritoneal tunic was removed; some granular deposit was also observed dipping between the tubular processes. The veins of the stomach both of the lesser and greater curvature, were so gorged with blood as to present a remarkable feature. The mucous surface of the viscus was of a purple madder colour throughout, and the greater part of the mucous membrane of the small intestines presented the same appearance. The mesenteric veins were much distended. The bladder exhibited, as to its mucous membrane, similar conditions to that of the stomach.

The history of this case presents us with all the most characteristic features of hypertrophy and dilatation of the heart; it exhibits also many circumstances illustrating the effects of mal-assimilation, and the consequent diseased condition of the blood. The position these several morbid conditions bear towards each other, it is impossible, with certainty, to define. Whether the heart-disease be the cause, and the other morbid conditions but the effect of the disturbed circulation; or whether reversely, the organic alterations in the heart's structure, be produced by an imperfectly formed circulating fluid, deficient in formative elements, or redundant with morbid material, and capable of exciting the heart to irregular action, it is not possible to determine. It is my wish on all occasions of our meeting for clinical study, to avoid mere speculative or hypothetical points, and to confine myself strictly to an explanation of the symptoms that are capable of illustrating the nature and progress of diseased action. Laying aside therefore the speculative matters just hinted at, let me turn your attention, first, to the more prominent and most characteristic symptoms of hypertrophy, with dilatation; and secondly, to the more complicated condition of deranged secretion and diseased blood.

The earliest symptoms recorded in the case book are those of cough and dyspnoea, accompanied by a peculiar form of expectoration. In searching for the cause or origin of these *pulmonary* symptoms, we fail to detect any specific commencement from an inflam-

matory attack, or anything analogous to an attack of bronchitis. The patient declared that the cough came on gradually, and became aggravated day by day, in an imperceptible manner, and that up to a certain period, though occasionally troublesome, it did not stop him from his usual avocations. The dyspnoea became subsequently very urgent, and compelled him to seek medical relief. Cough and dyspnoea thus gradually coming on, without any previous well-defined inflammatory attack, may generally be considered as indicative of some deranged condition of the pulmonary circulation, originating in irregular cardiac action. The mucous membrane in these cases is in a state of venous hyperæmia, sometimes called passive congestion; it is livid in colour, turgid, and oedematous, and a dirty-coloured brownish viscid secretion lines the bronchial tubes, and is the main cause of the cough and respiratory distress. When raised and expectorated, the sputa are specially characteristic of the above-described condition of the mucous membrane, differing remarkably from any form of excretion that usually follows inflammatory states of the bronchial tubes. The expectorated matter is glutinous—similar to glue, both in consistence and colour, of a dirty dusky ochre, or fawn colour, sometimes even still darker, as if the hæmaphæin of the blood were dissolved in it. This form of expectoration may be considered very characteristic of venous hyperæmia of the bronchial mucous membrane, arising from heart-disease. The cough commencing imperfectly, the dyspnoea and this peculiar glue-like expectoration may be taken as one series of the symptoms indicative of hypertrophy with dilatation.

The second series embraces the anasarous condition of the surface of the body, the oedematous condition of the face in the morning, or after sleep, and the general dropsical state of the system generally, the swollen legs, and distended scrotum. The third series of symptoms comprises the altered state of the secretions; the high coloured, orange-tinted, and albuminous urine, deficient in urea, abundant in uric acid and its compounds, diminished in quantity, and of high specific gravity; the dry, acid skin, the icteric aspect, and the offensive mud-coloured, imperfectly formed fæces. This category of symptoms suggests the heart to be, in a corresponding degree, deranged in function, and probably altered in structure; and though we cannot prove that all these symptoms are severally dependent on the diseased heart as their morbid cause, yet experience teaches us that they for the most part co exist, and that the presence of the above-enumerated series would be presumptive evidence of disease of the heart. The stethoscope amply confirmed this suspicion of cardiac disease, and enabled us to define, to a certain extent, the special form of disease affecting this organ; the impulse of the heart was increased to such an extent as sensibly to raise the head when applied to the chest; the rhythm of the heart's sound was not perfect; the systolic and diastolic murmurs were confounded, the latter merging into the systole, and not to be distinguished clearly from it. There was an aortic bruit heard over the aortic region, continuous with the systolic sound; hypertrophy, with dilatation

and some organic defect in the aortic valves, were thus detected; but the stethoscope not only indicated these alterations in the structural condition of the heart, upon the admission of the patient, but it enabled us to determine the progressive mischief and changes that were proceeding, unchecked by any of the remedies employed. Notwithstanding that at one time a favourable change appeared to take place, the worst symptoms being suspended, the anasarous condition having disappeared, the cough and dyspnoea abated, and this consentaneous with a general improvement in the several secreting functions, yet, nevertheless, the stethoscope revealed, even at this period, a peculiar aortic bruit, and on the 21st of January this had increased to a rough murmur, heard most plainly over the aortic valves, and which irregular sound clearly indicated some defective formation of, or adventitious growth upon, the membranous fold. The *post-mortem* examination explained this aortic murmur, and shewed it to have been caused by the fibrinous vegetations found appended to these valves.

The cardiac disease must be accepted as the cause of the dropsy, combined, perhaps, with a morbid condition of the liver, by which the freedom of the portal circulation was checked. The heart endowed by its increased volume of muscular fibre, with an augmented power, forces the arterial current through the aorta and the arterial trunks, with a force disproportionate to the power of the venous capillaries to carry it onward in its return to the right side. The dilated condition of the auricles, especially the right, diminishes the suction power by which the venous blood is in some measure moved towards the heart; the venous current is thus retarded, and general venous hyperæmia produced. Hence the anasarous state of the whole surface of the body, face, chest, arms, trunk, and lower extremities; and hence also the venous congestion of internal organs, kidneys, liver, mucous surface of lungs, stomach, and intestines, and the consequent alteration in the integrity of their several functions. The distressing state of the respiratory organs, the urgent dyspnoea, is in like manner caused by the heart-disease. The increased power of the right ventricle drives a volume of blood upon the lungs, with a force incommensurate with the oxygenating power of the ordinary respiratory process; venous congestion results. An œdematous state of the bronchial mucous membrane is among the morbid consequences; a mucous secretion, peculiar in its character, forms in the bronchial tubes, and a frequent harassing cough, vainly exhausts the patient in efforts to clear the air-passages from this impediment to the respiratory functions.

Such are the pathological conditions observed in this patient, and now let me detail to you the principles upon which the treatment of such a case should be conducted. Venous congestion, or retardation and obstruction to the venous current of blood, has been pointed out as the proximate cause of the most prominent symptoms; and to diminish the volume of blood moving to the right side of the heart, by venesection, should be our first effort. Blood taken from a vein in the arm, judiciously proportioned as to

quantity, quickly induces relief to the more urgent and distressing symptoms, the permanency of which is proportioned in a great measure to the extent of the disease. Internal remedies are feeble in their effects, and uncertain in their operation, till the congested state of the venous system has been relieved by blood-letting. Mercury produces no appreciable effect on the secretions,—digitalis is useless as an internal agent, till the plethoric condition of the system has been diminished. So soon as that has been effected, then these remedies, either separately or combined, oftentimes operate with marked success. You cannot have failed to notice in this case the immediate and sensible relief obtained from the more distressing symptoms, as soon as blood was taken from the arm. The cupping over the region of the heart obtained the effect desired, as far as the threatened or suspected indications of pericarditis were concerned; but it was not till after the bleeding from the arm, that the most evident benefit to the general symptoms was observed, and then also the effects of the mercury and digitalis quickly developed themselves in augmented and improved secretions, and a gradual abatement of the general dropsy. This favourable condition, however, did not continue, as is but too often the case; for it is but temporary relief that can be expected, when this form of heart-disease has made any progress. The urine again diminished in quantity, became more highly albuminous than before; anasarca of the lower extremities returned, but the cough and dyspnoea were not so distressing as on his admission. He was again bled, and the blood was reserved for analysis, to ascertain if urea could be detected in the blood, that element being deficient in the urine, and my object was to gain some additional evidence of the possible existence in the kidneys of that granular degeneration known as the morbus Brightii. At the time this analysis was made, I explained to you the method of conducting it. It is a process requiring much analytic skill. The presence of urea in the blood was determined, and you had an opportunity of seeing the minute crystals of the nitrate of urea under the field of the microscope. I had now no hesitation in believing that a granular state of the kidneys had to be added to the other serious morbid conditions, and with this complication to pronounce a most unfavourable prognosis; and as the prospect of any ultimate relief was very remote, and as injudicious efforts to obtain benefit from questionable remedies, after the general therapeutical indications have been fully carried out, oftentimes only aggravate the symptoms and hasten the catastrophe, it was thought advisable to depend on a simple diet, rest, and the occasional administration of such remedies as the more prominent or urgent symptoms might require.

He gradually got worse, but before his decease there occurred an irritable state of the stomach, with frequent vomiting,—a state of things scarcely requiring notice but for the remarkable character of the vomited matter, and the interesting opportunity afforded me of observing in it specimens of the *Sarcina ventriculi*, of Goodsir. The interest of this circumstance is increased by the fact that the vomited matter in this case appears to

have presented the same peculiar characters as were observed in the case recorded by that eminent microscopist, in his first account of this species, in the *Edinburgh Medical and Surgical Journal*. The vomited matter in that case is described as having the appearance of yeast, and the report in Burdett ward-book of the vomiting of this patient was that it looked like yeast. It was not till the following day that I had an opportunity of seeing this singular yeasty, pulpy mass, which I witnessed being ejected from the stomach. Its appearance was so peculiar that I at once placed it under the microscope, and then I immediately recognized those singular cubic and bale-like masses of vegetable development, minutely and regularly marked into sections of quadrupled subdivisions. There were also many tufts of margaric acid, with epithelial cells in abundance. There is much interest in the coincidence of the presence of the *Sarcina ventriculi* in vomited matter of the same physical characters, and it certainly gives force to the opinion of Goodsir, that in special cases the contents of the stomach suffer certain spontaneous or intestine changes, analogous to fermentation, and consequently opposed to the true digestive function, which must for the time be in abeyance, and that as the consequence of this fermentative process, certain vegetable structures are developed, of which the *Sarcina ventriculi* is an example.

THE LAW OF THE MORPHOLOGY OR METAMORPHOSIS OF THE TEXTURES OF THE HUMAN BODY.

(Fourth Series of Experimental Researches.)

By WILLIAM ADDISON, M.D., F.R.S., Malvern.

(Continued from page 263.)

XIV. INFLAMMATION CONSIDERED MORPHOLOGICALLY.

Vague generalizations with respect to the nature of the elements entering into the normal composition of the textures, and a neglect of the order of their appearance in the embryo, may be enumerated as obstacles to a knowledge of the real nature of inflammation and of the import of pathological facts. Among the *mucoous* membranes or textures many microscopical distinctions exist; and the same may be said also of the *serous* membranes. The outer covering or *tunica conjunctiva* of the eye-ball, differs from the *intestinal villi*; the *pia-mater*, from the *plexus choroides*, and the synovial membrane of the joints.

In researches directed to the attainment of a knowledge of the morphology of the elements of normal textures, for the purposes of practical medicine, it is important to arrive at some conclusion with regard to the relative values of a microscopical and chemical analysis; and the following considerations have prompted me to trust to the former as the surer and safer guide.

First, the microscopical investigations of SCHLEIDEN, SCHWANN, HENLE, BARRY, WHARTON JONES,

BENNETT, and others, have contributed to the development of a physiological law or order, by which abnormal changes may be rationally and scientifically tested; whereas chemical philosophers have done nothing in this respect. Secondly, microscopical analysis reveals elements and forms, as nearly as possible as they exist in the living structure,—nay, in the living body itself; whereas, a chemical analysis furnishes only the result of complex manipulations, in which unnatural agents are employed, unnatural changes produced, and unnatural products evolved. Thirdly, the materials for the growth and nutrition of living bodies are prepared or elaborated in the interior of closed vesicles or cells, so that when the cell-wall ruptures, and the interior matter is thereby exposed to new agents, new changes occur; and alterations of form and quality therefore anticipate a chemical investigation. Lastly, vegetable morphology, as a branch of scientific research, owes everything to the microscope, and nothing to the filtering paper, the test-tube, or the crucible; it is therefore reasonable to expect that the normal order of animal morphology may be equally as well illustrated by the same means. Not that microscopical and chemical investigations are to be considered as in any way opposed to each other; on the contrary, the question is, which, in the present state of our knowledge, affords the most useful and trustworthy information. Chemical facts in their relation to the structure and functions of living beings, appear to me, at present, as loose and isolated materials, which may hereafter find their useful applications; but to the microscope will, if I mistake not, belong the credit of enabling us to establish physiological and really practical principles.

In applying the law of morphology in explanation of the phenomena of inflammation, the distinctions between *organs*, *textures*, and *elements*, must be insisted on.

In vegetable structures,—leaves, sepals, petals, stamens, and carpels are organs.

It has been shown (I., p. 33) that leaves are composed of two distinct cellular textures, (the coherent respiratory, and the incoherent secretory,) of a supporting fibrous texture, spiral vessels, and stomata. The same kind of demonstration may be extended to all vegetables organs.

It has also been shown, (I. and II., pp. 33 and 61,) that the elements contained within the secretory cells are either a viscous protoplasm mixed with molecules, green granules of chlorophyll, with sundry properties and qualities; or (as in petals,) a coloured fluid with molecules. The differences in these elements being due to an elaborating process effected within the closed cells in obedience to a fixed morphological law.

The same kind of demonstration may be extended to animal structures. In the human body, for example, the liver, the lung, the brain, the kidney, and a bone, are organs; each organ being composed of various