country, recommending this, and condemning that, as he saw right.

While on this subject, we must take the opportunity of protesting against the impertinent system of wine touting now pursued by so many foreign wine-merchants. As regularly as spring comes round, M. A. of Vin Rouge, Herr B. of Swiggerheim, Signor C. of Villa Corpo di Bacco, intrude themselves with so good address and manner, as quite to beguile your servant, into your study, and try to persuade you that the only plan to have *good* wine and *reasonable* is to give them an order. They stick like burrs; they wont go; they will change the wine if you don't like it; you need not even pay for it if you don't like it; and you are generally worried into ordering a case of wine you don't want, and don't like when you have got it.

In conclusion, we give a caution, if after the perusal of this 'Report on Cheap Wines' any of our readers venture on a trial, don't lay in a stock—buy from hand to mouth literally; for if a quantity is bought and not used quickly, it will probably be impossible to present it to your friends or drink it yourself.

There is no purchase so dear as bad wine. It is mischievous in its effects, painful in consumption, and becomes a potatory, slow suicide; but that price and quality have no relation to each other in some hands is plain enough to those who, having ventured to order wine at these grand limited hotels in London and its vicinity, find sherry at 8s. per bottle is only our old friend at 40s. per dozen; and Gladstone at 4s. per bottle is only something else of an equally common kind. As we before said, Dr. Druitt's book is only too brief; but the short time which anyone will spend in reading it will be well and profitably occupied.

ART. IX.—*On the Arrangement of the Muscular Fibres in the Ventricles of the Vertebrate Heart: with Physiological Remarks.* By JAMES BELL PETTIGREW, M.D. (Reprint from the 'Philosophical Transactions,' part iii.)—London, 1864.

2. *On the Relations, Structure, and Function of the Valves of the Vascular System in Vertebrata.* By JAMES BELL PETTIGREW, M.D. (Reprint from the 'Transactions of the Royal Society of Edinburgh,' vol. xxiii. part iii.)—Edinburgh, 1864.

THE first of these communications, lengthy and elaborate and well illustrated as it is, both by the description of dissections and by diagrams taken from photographs, is divided into four sections, devoted respectively to the anatomy of the ventricles of the

fish, of the reptile, and of the bird and mammal, that devoted to the ventricles of the mammal being much the most minute and detailed. The author prepares his hearts by continued boiling (from four to six hours in the case of small quadrupeds, and from eight to ten in that of the larger) having first stuffed the ventricles with some pliant material, as bran, bread-crumbs, so as to distend without overstretching the muscular fibres, and by means of his dissections he observes that he has arrived at results "which appear to throw additional light on this complex question, and which seem to point to a law in the arrangement, simple in itself, and apparently comprehensive as to detail."

We find it utterly impossible to put the reader in possession of the intricate details of this paper, the full understanding of which requires frequent allusions to the diagrams; we must be content to supply an epitome of the conclusions to which the author arrives at. They are summed up in the following twelve statements, which we give in his own words. He observes:

"I. By exercising due care, I have ascertained that the fibres constituting the ventricles are rolled upon each other in such a manner as readily admits of their being separated by dissection into layers or strata, the fibres of each layer being characterized by having a different direction.

"II. These layers, owing to the difference in the direction of their fibres, are well marked, and according to my finding, are seven in number—viz., three external, a fourth or central, and three internal.

"III. There is a gradational sequence in the direction of the fibres constituting the layers, whereby they are made gradually to change their course from a nearly vertical direction to a horizontal or transverse one, and from the transverse direction, back again to a nearly vertical one. Thus, in dissecting the ventricles from without inwards, the fibres of the first layer, which run in a spiral direction from left to right downwards, are more vertical than those of the second layer, the second than those of the third, the third than those of the fourth—the fibres of the fourth layer having a transverse direction, and running at nearly right angles to those of the first layer. Passing the fourth layer, which occupies a central position in the ventricular walls, and forms the boundary between the external and internal layers, the order of arrangement is reversed, and the fibres of the remaining layers—viz., five, six, and seven—gradually return in an opposite direction, and in an inverse order, to the same relation to the vertical as that maintained by the fibres of the first external layer. This remarkable change in the direction of the fibres constituting the several external and internal layers, which is observed to occur in all parts of the ventricular walls, whether they be viewed anteriorly, posteriorly, or septally, has in part been figured by Senac, and imperfectly described by Reid, but has not, so far as I am aware, been prominently brought forward by any one. [The gradation in direction referred to is here illustrated in the original paper by arrows.]

"IV. The fibres composing the external and the internal layers are found at different depths from the surface, and from the fact of their pursuing opposite courses cross each other,—the fibres of the first external and last internal layers crossing with a slight deviation from the vertical; the succeeding external and internal layers, until the fourth or central layer, which is transverse, is reached, crossing at successively wider angles. [The direction of these fibres is here illustrated in the original by diagrams.]

"V. The fibres composing corresponding external and internal layers, such as layers one and seven, two and six, &c., are continuous in the left ventricle at the left apex, and in the right ventricle in the track for the anterior coronary artery, the fibres of both ventricles being for the most part continuous likewise at the base.

"VI. From this distribution of the fibres, it follows that the first and seventh layers embrace in their convolutions those immediately beneath them, while these in turn embrace those next in succession, and so on until the central layer is reached—an arrangement which may in part explain, alike, the rolling movements and powerful action of the ventricles.

"VII. The fibres of the right and left ventricles anteriorly and septally are to a certain extent independent of each other; whereas posteriorly many of them are common to both ventricles—i.e., the fibres pass from the one ventricle to the other, an arrangement which induced Winslow¹ to regard the heart as composed of two muscles enveloped in a third. It will be evident from this distribution of the fibres, that while the ventricles are for obvious reasons intimately united, they nevertheless admit of being readily separated.

"VIII. If the hinge-like mass of fibres (common fibres) which unite the right ventricle to the left posteriorly be cut through, and the right ventricle with its portion of the septum detached, the left ventricle will be found to be nearly as complete as it was before the separation took place, and to consist of four sets of conical spiral fibres—two external and two internal sets.

"On the other hand the right ventricle, and its share of the septum, consists only of conical-shaped spiral fragments of fibres, or at most of flattened rings—a circumstance which, when taken in connexion with others to be mentioned presently, has induced me to regard the left ventricle as the typical or complete one, the right ventricle being a mere segment or portion nipped off at some period or other from the left.

"IX. If the right ventricular walls be cut through immediately to the right of the track for the anterior and posterior coronary arteries, so as to detach the right ventricle without disturbing the septum, and the septum be regarded as forming part of the left ventricular wall, it will be found that the fibres from the right side of the septum, at no great depth from the surface, together with the external fibres from the left ventricular wall generally, enter the left apex in two sets; and if their course in the interior be traced, they are observed to issue from the left auriculo-ventricular opening, also in two sets; in

¹ *Mémoires de l'Académie Royale des Sciences*, 1711, p. 197.

other words, the left ventricle is bilateral. I would particularly direct the attention of investigators to this bilateral distribution of the fibres, as it has been hitherto overlooked, and furnishes the clue to the arrangement of the fibres of the left ventricle.

"X. The double entrance of the fibres at the left apex, and their exit in two portions from the auriculo-ventricular opening at the base, are regulated with almost mathematical precision; so that while the one set of fibres invariably enters the apex posteriorly, and issues from the auriculo-ventricular opening anteriorly, the other set as invariably enters the apex anteriorly, and escapes from the auriculo-ventricular opening posteriorly. But for this disposition of the fibres, the apex and the base would have been like the barrel of a pen cut slantingly or lopsided, instead of bilaterally symmetrical as they are.

"XI. The two sets of fibres which constitute the superficial or first external layer of the left ventricle, and which enter the left apex in two separate portions or bundles, are for the most part continuous in the interior with the muscoli papillares, to the free ends of which the chordæ tendinæ are attached. These columns occupy different portions of the left ventricular cavity, and give a very good idea of the symmetry which prevails throughout the left ventricular walls.

"Lastly. The apex is opened into and enlarged, and the auriculo-ventricular orifice widened, by the removal of consecutive external and internal layers, from the fact of the left ventricular cavity tapering in two directions and forming a double cone.

"There are other points worthy of mention, such as the construction of the septum, fleshy pons, and conus arteriosus, the varying thickness of the right and left ventricular walls, the shape of the right and left ventricular cavities, &c. To these, however, allusion will be more conveniently made subsequently.

"As the structure of the ventricles, with one or two exceptions, is the same in all mammals, *man included*, I have chosen to describe the arrangement of the fibres in the ventricles of the sheep and calf, from the readiness with which the hearts of these animals may be obtained. My descriptions, however, will by no means be confined to them."

Such is the summary of the facts established in this memoir, a consideration of which will show the extent to which Dr. Pettigrew has brought our knowledge of the subject beyond that which the labours of his predecessors in the same field of observation had secured to us.

The communication which stands second at the head of this notice, that referring to the valves of the vascular system, is, like the first one, very exhaustive and well illustrated by diagrams from casts and photographs. In his researches the author has occasion, when describing the peculiarities of the auriculo-ventricular valves, to allude to the arrangement of the muscular fibres in the ventricles (the subject of the paper which we first noticed)

and does not confine his observations to any particular form of valve, but scrutinizes in succession the valvular arrangements of the fish, reptile, bird, and mammal. He freely controverts, where he thinks he is borne out by the results of his dissections, the statements of former investigators, such as John Hunter, Chevers, Dr. Halford, &c., and after treating in succession various topics, presents us with the following *résumé* of the points dwelt upon in his investigations:

“*First.* An attempt has been made to point out the intimate structural relation, existing between the veins, and venous valves; how the segments of the venous valves are composed principally of white fibrous and yellow elastic tissue, arranged in at least three well-marked directions; and how the segments are so disposed, that their free margins, unless when the blood is actually passing between them, are always more or less in apposition. An attempt has also been made, to demonstrate the nature of the apposition, by the employment of plaster of Paris, injected while in the fluid state into the distal and proximal extremities of the vessels. In the veins, as was pointed out, *the closure is to a great extent mechanical*; the segments, when two are present, being forced together in the mesial plane of the vessel, by the contraction of its walls, but principally by the weight of the reflux blood.

“*Secondly.* The structure and relations of the arterial or semilunar valves, particularly in man, have been examined afresh; a more precise description than that hitherto given of the segments in systematic treatises on anatomy having been essayed. The great vessels have further been shown to bifurcate at their origins, and to be greatly thickened between the segments, which they support and incline towards each other—an arrangement calculated to bring the free margins of the segments more or less closely together, unless when pushed aside by the advancing column of blood during the systole. The sinuses of Valsalva have, in addition, been shown to vary in size; the one curving towards the other in a spiral direction, and causing the blood to act in spiral waves upon the segments of the semilunar valves, which by these means are twisted and wedged into each other, when the reflux occurs. In the arteries, the action of the semilunar valves, as has been explained, *is for the most part mechanical*, the strong fibrous rings situated at the aortic and pulmonic orifices, tending to counteract the inconvenience, which might be supposed to result from an excess of vital contractility in the vessels and the ventricles. The arterial semilunar valves may be said to differ from the bi-semilunar venous ones, in having their segments wedged together by a spiral movement, which in the venous valves, is little more than indicated.

“*Thirdly.* The bulbus arteriosus of fishes, has been shown to be a contractile organ, and to contain in its interior a system of valves, the segments of which are, as a rule, more numerous than in either the veins or arteries. They have, in some instances, tendinous bands,

resembling chordæ tendineæ, running between them ; and are for the most part arranged in tiers ; so that the blood which is not caught by the one set, falls into, and is supported by the next. The action of these valves, as will readily be inferred, is *partly mechanical, and partly vital* ; for the contraction of the bulb must be regarded as contributing to the closure. They are, therefore, an advance upon the valves of the veins and arteries both as regards their number and the manner of their closure.

"*Fourthly.* In the reptiles, as has been demonstrated, *the valves are partly tendinous and partly muscular* ; while in the right ventricle of the bird *they are altogether muscular*. Here, then, may be witnessed the first trace of a self-regulating power—*actively contracting muscular fibre* taking the place of *non-contractile fibrous tissue*.

"In the auriculo-ventricular valves there is immense variety ; these including most of the forms referred to, and others exhibiting a still higher degree of differentiation. They are, for the most part, characterised by the presence of chordæ tendineæ, which connect them with the interior of the ventricles, or the structures arising therefrom ; viz., the carneæ columnæ and muscoli papillares. The auriculo-ventricular valves, therefore, differ from the semilunar valves proper. In some instances, only one semilunar flap is present ; and this may be either *altogether fibrous*, or *partly fibrous and partly muscular*, or *altogether muscular*. In a second, there are two flaps or segments, so arranged that *their long diameters correspond to the direction of the muscular fibres lining the ventricular cavity ; the segments being continuous with the muscular fibres referred to*. In a third, the two segments are attached to the interior of the ventricle *by rudimentary chordæ tendineæ*. In a fourth, two accessory or smaller segments are added to the two principal ones ; *the whole being attached by well-developed chordæ tendineæ to rudimentary muscoli papillares*. In a fifth, which is the most perfect form of valve, as it exists in man and in the higher mammalia, the segments are from four to six in number, *most exquisitely and symmetrically formed, and attached by minutely graduated chordæ tendineæ to highly developed carneæ columnæ and spiral muscoli papillares*.

"The action of the auriculo-ventricular valves, owing to the want of uniformity in the number, structure, and relations of their segments, is varied. It is, however, on all occasion, carefully adapted to the wants of the circulation, and to the configuration of the ventricles and ventricular cavities ; these cavities, as has been pointed out, adapting or moulding the blood, and causing it to act in given directions. Thus in the fish, where the circulation is slow, and where the ventricle is conical in shape, and composed of fibres interlacing in all directions, the segments, where two are present, are forced towards each other by the uniform expansion of the blood, and by the contraction of the ventricle, in a manner analogous to that by which the segments of the bi-semilunar venous valves are approximated by the retrogressive movements of the slowly advancing venous blood, assisted to a slight extent by the vital contractility of the vessels.

"In the reptile, where the circulation is also languid or slow, the shape of the ventricle, owing to the fibres pursuing a more or less spiral direction, is that of a cone slightly twisted upon itself. As the spiral arrangement extends also to the valves, their action may be aptly compared to that which obtains in the valves of the largest veins, and in the arteries. It is, however, in the auriculo-ventricular valves of the bird and mammal, that the spiral action of the segments becomes most conspicuous; the nature of the action being unavoidably determined, by the unmistakably spiral arrangement of the muscular fibres composing the ventricles, and by the spiral nature of the musculi papillares and ventricular cavities. As, however, the action of these valves has been already explained at great length, further allusion to them at this stage is unnecessary.

"The valves of the vascular system of the vertebrata, as will be perceived from this summing up, form a progressive and gradually ascending series; the valves in the veins exhibiting a lower type than those in the arteries; the valves in the arteries being less fully developed than the valves occurring in the bulbus arteriosus and in the auriculo-ventricular orifice of the fish; the valves in the fish being less highly differentiated than the valves in the reptile and bird; these again falling short both in complexity and adaptive power to those met with in the mammal. In the mammal the valvular arrangements may be said to culminate."

These monographs must henceforth be consulted by all seeking to make themselves acquainted with the most recent advances in our knowledge of the structures of the organs of circulation. They reflect the highest credit on the assiduity and philosophical acquirements of their author.

ART. X.—*A Contribution to the Anatomy of the Amphibian and Reptilian Retina.* By J. W. HULKE. pp. 26.

THE retina of the following animals has been the subject of Mr. Hulke's careful and minute researches: the frog, the black and yellow salamander, the common snake, the blind worm, Spanish gecko, land-tortoise, the water-tortoise, the edible turtle. The method adopted by him was to examine the retina immediately (when possible) after the decapitation of the animal, and both alone and with chemical agents, hardening the sections made of the membrane by alcohol or by an aqueous solution of chromic acid, and after imparting a stain to these sections by iodine or carmine, rendering them transparent by glycerine, either pure or diluted.

The results thus obtained showed, he states, a uniform type of structure of the retina of all the amphibian and reptilian species he examined, subject, however, to modifications justifying Müller's anticipation, that a special study would bring out characters sufficient to enable the anatomist, from the examination of a