

the cornea and evacuating the aqueous humor, preparatory to the efficient use of eserine.

In any case of glaucoma in which the pupil is firmly bound down by adhesions, or is otherwise so fixed that mydriasis cannot cause thickening of the iris opposite Fontana's space at the angle of the anterior chamber, especially if the application of eserine aggravates the symptoms, it is justifiable to apply atropin or some other mydriatic, and in a small proportion of cases such applications will be of marked benefit.

Myotics are beneficial in glaucoma only when the pupil is still movable; that is, chiefly in the earlier stages. When not beneficial, they are usually distinctly injurious.

If for any reason iridectomy cannot be done, myotics are always to be tried in the earlier stages of the disease. If they cause marked improvement they may be continued so long as they cause improvement. If they reduce the eye tension they may be continued so long as they keep the tension down; if they promptly relieve attacks they may be continued so long as the attacks are rendered less severe and frequent, and leave no permanent impairment of function, either of central vision or of the field, in the interval. But in the vast majority of cases there will come a time when the influence of the myotic, although still favorable, is less favorable than it has been; and after this it is liable rapidly to lose its power to do any good at all. Hence, whenever this period arrives the patient should be warned that the myotic is insufficient, practically worthless, and an operation, preferably iridectomy, gives the only chance for escaping complete blindness, and, perhaps, intense suffering.

THE DESCRIPTIVE ANATOMY OF THE HUMAN HEART.

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THE magnificent work of Braune and His has, within the past decade, revolutionized many sections of descriptive and topographical human anatomy. Till lately, dissection of the fresh or imperfectly-prepared subject was the only means used to arrive at a knowledge of the form and relations of each structure; but within recent years the examination of the body made while frozen, and the dissection of subjects hardened to comparative rigidity by continued intra-arterial infusion of such hardening agents as chromic acid, chloride of zinc, or corrosive sublimate, have corrected grave errors which had arisen from the exclusive study of the organs in the flaccid condition met with when ordinary methods are used. Even on the post-mortem table, and

within thirty-six hours of death, the liver, spleen, and heart "flop" out of all shape (I can think of no more expressive word, if it be somewhat inelegant), and are no more like the same organs as seen when hardened *in situ*, than the jelly-fish, half embedded in the sand—a shapeless and repulsive mass—resembles the living embodiment of symmetry and beauty propelling itself through the clear blue water. What, then, must be the condition of the same organs weeks or months after death, in bodies preserved by freezing or by arsenical solutions which do not harden the tissues? Verily, such organs are the despair of the medical student, and those who have never seen hardened organs may well be excused should they regard the models of His and allied descriptions with a certain amount of respectful incredulity. Such, I confess, was my own feeling toward them till, on the adoption of my present method of preserving bodies, I found to my surprise that these and other organs were thereby sufficiently hardened to present almost perfect counterparts of these models, without any interference with the methods of dissection. Thus there is now in my dissecting-room scarcely a liver, kidney, or spleen removed by the student from his subject that does not exhibit in perfection all the surfaces, borders, and impressions described and modelled by His.

While the text-book descriptions of liver, kidney, and spleen have been changed to accord with recent views, it is somewhat strange that the heart is still portrayed as it used to be many years ago; and that, though it requires the most vivid imagination and elastic conscience to reconcile the description with the accepted model of His; and this is still more strange, since clinicians have found the text-book descriptions of the organ so utterly inadequate that they have had to invent terms of their own in order to indicate anatomical facts in the living—terms which have no place in the dissecting-room vocabulary. I have long felt that, though the description of the heart as presenting a base, apex, right and left borders, and anterior and posterior surfaces is sufficient to describe the flabby, shapeless mass one finds on the post-mortem table when the excised organ is there before one, yet it is useless as applied to His's model or my own specimens hardened *in situ*. I have, therefore, for the past few years described in my lectures what I saw before me, without reference to the text-book; and I feel that the matter is of sufficient importance to merit presentation to my brother anatomists. When I consider that my own description is immensely more complex than that now in vogue, I feel some little compunction in suggesting an additional burden to the already sorely-laden student of anatomy; but I am encouraged by the remembrance of what has happened in the case of the liver. That organ, which, in the primitive simplicity of old text-book descriptions, had only two borders, two surfaces, and no impressions at all, has now five borders, as many surfaces,

and eight impressions; but everything is so definite, its relations are so evident, and the picture can be so vividly printed on the brain that what was before a pure matter of memory and a puzzle to the student, is now easily described and readily understood and remembered.

First, let me allude to the inconsistencies in our accepted descriptions. The pericardium is spoken of as cone-shaped, its apex upward, its base resting on the diaphragm. Yet the heart, which, with the commencement of the great vessels, completely fills it, is described as a cone with its apex directed downward, forward, and to the left, and its base upward, backward, and to the right. But this is a small matter, and probably justifiable; graver inconsistencies are to come.

Clinical manuals, such as Gibson and Russell's *Physical Diagnosis*, and articles on topographical anatomy, such as that in Morris's *Treatise*, discard the word "base," or explain that in their use of it they mean the "upper limit;" use "lower border" to signify what in the dissecting-room we call the "left border," apply the term "right border" to what in the dissecting-room we do not describe at all, and their "left border" is anything but synonymous with the left border of the descriptive anatomist.

Having, I trust, succeeded in showing that some change is necessary, I shall endeavor to submit to you a description of the external configuration and relations of the human heart which shall be accurate, concise, and free from redundancy. I would beg that those who honor my description when in print with a careful perusal, will compare it and the illustrations with the model by His, and those who desire to verify it in the dissecting-room may do so in any body injected through the right common carotid or femoral artery with a gelatine injecting mass.¹ The drawings are made from a rather enlarged specimen, of which the right side was filled with coagulated blood and the left side with injection mass; but, though large, it agrees in all essential matters with His's model and many other dissecting-room specimens I have carefully examined. My description is markedly borne out by vertical sagittal mesial and vertical coronal sections of the frozen body; horizontal section I have not yet been able to compare it with.

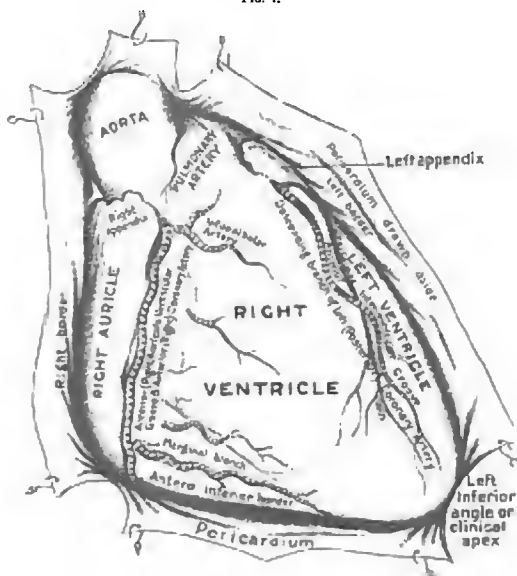
Thus viewed, the heart is an irregular, four-sided pyramid, whose base rests on the diaphragm, and whose apex has been, as it were, removed to afford attachment for the ascending trunks of the great vessels. It thus presents for examination five surfaces (including the base), borders separating these, an anatomical apex, and a "clinical apex," a term which I feel compelled to retain because it is almost inseparable from physiological and clinical phraseology.

The anterior surface (Fig. 1), the first which meets the eye when the

¹ My description is beautifully illustrated by specimens obtained from bodies prepared by injections of formaldehyde (5 per cent. of a 40 per cent. solution).

chest and pericardium are opened, is triangular in shape, slightly convex, and is directed forward and a little upward, being in sagittal mesial section parallel with the sternum. It includes the greater part of the right ventricle, and portions of the left ventricle, left auricular appendix, the whole right appendix, and part of the right auricle. It is bounded below by the sharp, almost straight antero-inferior border (*margo acutus*), on the left by the oblique, convex, and slightly rounded left

Fig. 1.



Anterior surface of the heart as seen in situ when the pericardium is opened.

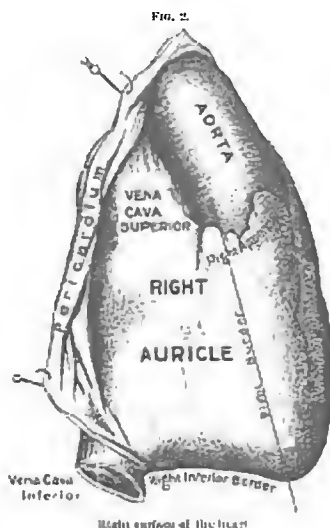
anterior border (the left border of elinicians), and on the right by the nearly vertical and convex right anterior border (the "right border" of elinicians). Its superior angle marks the anatomical apex, and here the surface merges in the anterior walls of the aorta and pulmonary artery. Its left anterior angle forms the clinical apex.

On this surface are seen the anterior or right coronary artery in the anterior auriculo-ventricular groove, while its marginal branch runs

along the antero-inferior border; and in the anterior interventricular groove is the descending branch of the posterior or left coronary artery, accompanied by the great cardiac vein.

Relations. Separated from it by the pericardium are the margins of the lungs and pleura, the sterno-pericardial ligaments, triangular sterni, internal mammary vessels, and sternum.

The right surface (Fig. 2) is markedly convex, four sided, lies almost vertically, and is directed toward the right. It includes the greater part



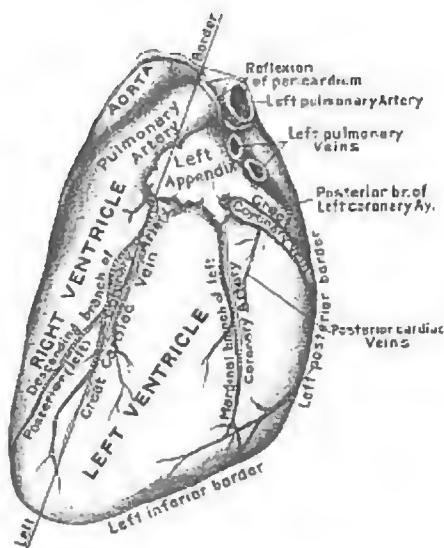
of the right auricle. Its anterior, posterior, and inferior borders are only slightly rounded, and are therefore fairly well defined. At its superior extremity the surface blends with the wall of the superior vena cava, and at its posterior inferior angle it is similarly related to the vena cava inferior.

Relations. It is separated by pericardium from the right phrenic nerve and vessels, pleura, and inner surface of the right lung.

The left surface (Fig. 3) is a convex, triangular area, directed mainly upward and toward the left. It includes about one-half of the free surface of the left ventricle and the left auricular appendix. It is

separated from the anterior surface by the left border; from the inferior surface by a rather sharp left inferior border, and behind it is bounded by the left pulmonary veins and left auriculo-ventricular groove with the coronary vein embedded therein. It presents the proximal extremities of the descending branch of the left coronary artery and great cardiac vein, the marginal and transverse branches of the same artery, and the posterior cardiac and coronary veins.

FIG. 3.



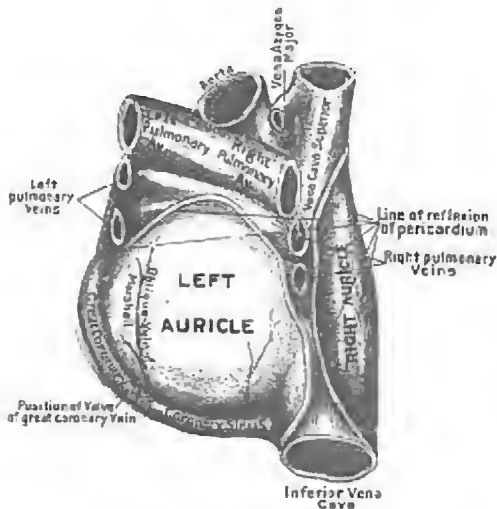
Left surface of the heart.

Relations. It is separated by pericardium from the left phrenic nerve and vessels, left pleura, and inner surface of the left lung.

The posterior surface (Fig. 4) (dorsal surface) is called the base in text-book descriptions. It is four-sided, rather narrower above than below, is convex, vertical, and directed backward. It is formed by the left auricle and by the portion of the right auricle which joins the two venæ cavæ behind, and is bounded by rather sharp and well-defined borders. It is bounded below by the inferior vena cava and the coro-

nary sinus, above by the right pulmonary artery, on the right by a fairly defined border joining the two venæ cavæ, and on the left by the cardiac openings of the left pulmonary veins and by the great coronary vein. It presents the openings of the coronary veins (right and left), the great coronary vein and coronary sinus, and the oblique vein of Marshall, which last runs downward over the surface to enter the left extremity of the coronary sinus. It is only partially invested by the serous layer of the pericardium.

FIG. 4.

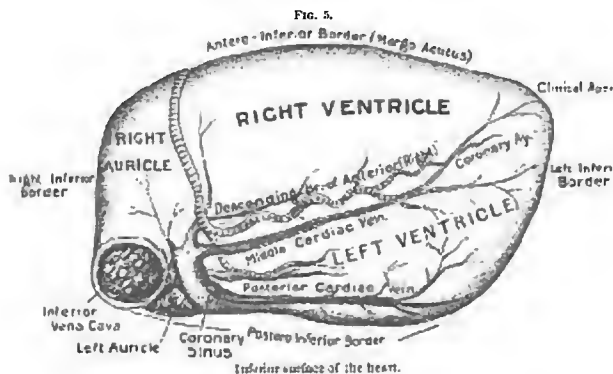


Anterior surface of the heart.

Relations. It is separated by pericardium from the bronchi, œsophagus and vagi, descending aorta, vena azygos major, and thoracic duct.

The *inferior surface* (Fig. 5) (diaphragmatic surface or *base*) is quadrilateral, slightly convex or almost flat when the ventricles contain blood, slightly concave when they are empty and relaxed. It is directed downward and a little backward and toward the right, and is bounded by rather sharp and well-defined borders. It is formed by a small portion of the right auricle and opening of the vena cava inferior, the rest of the surface being about equally divided between the right and left ventricles.

Behind the vena cava is seen a small portion of the left auricle. In addition to the inferior caval opening, it presents the inferior extremities of the right (anterior) and left (posterior) interventricular grooves, with the right coronary artery embedded in the former and the coronary sinus in the latter. Crossing it diagonally is the inferior interventricular groove, with the descending branch of the anterior (or right) coronary artery and middle cardiac vein. The posterior cardiac vein runs along its posterior border.



Relations. It is separated by the central tendon of the diaphragm and some diaphragm muscle from the superior surface (*impressio cardica*) of the liver.

The *apex* of the pyramid is formed by the aorta (Fig. 1), pulmonary artery (Fig. 3), and superior vena cava (Fig. 2), and these structures spring from the heart on a level with the upper margin of the third costo-sternal articulation, extending an inch and a half to the left and one inch to the right of the middle line. This we may conveniently name with clinicians the *upper limit* of the heart.

SUPERFICIAL INDICATIONS. The *upper limit* of the heart has just been indicated. The left half of this line will mark the position of the pulmonary and aortic valves.

The *clinical apex* is indicated by a point between the fifth and sixth ribs, three and one-half inches to the left of the middle line.

The *antero-inferior border* is to be indicated on the chest-wall by an oblique line, slightly convex downward, extending from the clinical apex on the left across and slightly upward to a point one inch to the

right of the middle line at the level of the sixth chondro-sternal articulation. Along this line the cardiac blends insensibly with hepatic dulness.

These lines being drawn, the right and left borders of the heart's anterior surface or the absolute lateral limits of the heart's dulness will be defined by convex lines joining respectively their right and left extremities. Thus, on a level with the fourth chondro-sternal articulation, the area of the heart's dulness extends three inches to the left and one and three-quarters inches to the right of the middle line.

It would seem more consistent with the above description to change some other elements in the cardiac nomenclature. For instance, the interventricular grooves are seen to be superior and inferior. The *right coronary artery* I would name *anterior*, and its branches respectively *infundibular* (as at present), *right ventricular* (now "marginal"), and *inferior interventricular* (now *descending*); the *left coronary artery* would be better named *posterior*, and its branches *superior interventricular* (now "descending"), *left ventricular* (now *marginal*), and *auriculo-ventricular* (now *transverse*).

RELATIONSHIP OF MIGRAINE TO EPILEPSY.

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ALL writers on this subject are agreed that migraine and epilepsy are kindred diseases, and that this kinship is so close that these diseases are not infrequently twin inheritances from the same neurotic ancestors.

Concerning this relationship, Landon Carter Gray says:¹ "Some eleven years ago I called attention to the association of epilepsy with migraine, not knowing till some time later that Tisset, Parry, and Living had previously observed the same association. In these cases epilepsy alternates with migraine, the migraine disappearing when the epilepsy appears, and the epilepsy returning when the migraine disappears. By this I do not mean to say that all cases of migraine are subject to epilepsy, but I do mean to say that there is a very close relationship between migraine and epilepsy, and in some cases the relation is so close as to permit of this alternation; indeed, almost all cases of migraine will be found at some period of their lives to have had a loss of consciousness, with or without convulsive movements, although generally this fact is strenuously denied."

On this same subject B. Sachs² speaks as follows: "The relation of

¹ *Nervous and Mental Diseases*, 1856.

² *Nervous Diseases of Children*, 1895.