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The movements of the mitral valve flaps studied by a new method.

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The desirability of a more accurate knowledge of the movements of the auriculo-ventricular valves led to the adoption of the following method of study in the perfused cat's heart: The margins of an opening in the left auricle are stitched to the bottom tube of a small cylindrical reservoir in which the height of pressure is regulated and varied by a set of lateral overflow-tubes. To one of the mitral valve flaps is attached a human hair communicating with a short and delicate lever of straw, held upward by slight spring tension. Whenever the valves move up the lever is elevated and a small mirror attached to the axis of the lever system is depressed. Upon this mirror is projected a beam of light and through its reflection the movements of the mirror are recorded upon a moving bromide surface. In this way the oscillations of the valve flaps may be optically recorded and compared with simultaneous optical tracings of auricular and ventricular activity. To prevent the transfer of ventricular movements to the threads connecting with the valves, the heart is fastened by stitches, carefully placed around the auriculo-ventricular ring to a neatly fitted ring of metal.

A study of the records thus far obtained indicates that the following movements of the auriculo-ventricular valves occur in every cardiac cycle: A very short interval after the *onset of auricular systole*, the cusps are slightly depressed toward the ventricle, but before the *end of auricular systole* they quickly ascend toward the auricle. With the onset of *auricular diastole* (which in these experiments began a distinct interval before subsequent ventricular systole) the valves move ventricle-ward to their former position. With the onset of *ventricular systole* the cusps immediately move upward and close completely. So they remain until ventricular relaxation begins. During *ventricular diastole* the valves move ventricle-ward to a position that is lower

than that occupied previous to either auricular or ventricular systole. In the latter portion of diastole (diastasis) they gradually float upward but to a slight extent only. Superimposed upon the main curves of closure are found oscillations of much smaller amplitude and of shorter period. Further investigation is necessary before it may be justly concluded that these correspond to the vibrations responsible for the heart sounds.

The conclusion is reached that the mitral valves undergo two movements toward closure in each cardiac cycle, the first near the end of auricular systole, which is transient and incomplete, and the second lasting throughout ventricular systole which is complete and insures the effective closure of the valves.

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Blood fat in relation to heat production and depth of narcosis.

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Experiments on dogs have been designed to answer the questions: (1) whether fat injected directly into the circulation can be oxidized at once, and (2) what is the relation between the concentration of fat in the blood and the heat production. Incidentally it has been necessary to determine whether the depth of narcosis had any effect on the amount of fat in circulation, and on the heat production.

The following experiments may be cited as typical of the effect on percentage of blood fat and on heat production, of a single intravenous injection of 100 c.c. 3 per cent. emulsion of lard oil. It will be seen that the heat production rises and the R. Q. falls as the fat becomes more concentrated in the blood, indicating, therefore, that the injected fat burns.

In order to insure complete muscular rest chloretone was administered to a number of the animals and it was while controlling the effect of this narcotic that the following observations were made: (1) The percentage of blood fat runs parallel with the depth of narcosis, *i. e.*, the deeper the narcosis the lower the blood