

action of the latter drug was greatly enfeebled when given in combination. Dr. Anderson read a paper in Edinburgh, in 1854, showing that these drugs were antagonistic in their action upon the system. Trousseau, in his "Treatise on Therapeutics," also makes this a strong point. He says:

"Angelo Poma, Cazin, Benjamin Bell, Béhier, Lec, McNamara, Seaton, Erlenmeyer, Onsum, Bathurst Woodman and Fournier, all give cases of belladonna poisoning cured by opium."

"In these cases it is remarkable that persons poisoned by belladonna have been able to take enormous doses of opium without showing the symptoms of intoxication from opium."

(According to M. Béhier the quantity of opium required to combat the intoxication of belladonna ought to be greater than that of the belladonna taken.)

(In the case of the girl that recovered, although I gave her 1½ grs. of morphia hypodermically in two hours, she regained consciousness in four or five hours after, and exhibited none of the usual symptoms expected from large doses of that drug.)

### THE CIRCULATION IN THE CORONARY ARTERIES.

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It is not my intention to go into a detailed discussion on the history of scientific opinion regarding the way in which the blood is impelled through the coronary arteries. I may mention that the view generally adopted is that the coronary arteries are filled from the aorta, by the recoil of this vessel after the ventricle has contracted and driven its contents into it. The main reason advanced in support of this view was, that when the left ventricle contracts and the blood is driven into the aorta, the semilunar valves are pressed back so closely to the walls of the aorta, that the entrance to the coronary arteries is completely closed. If this be true, then the

coronary arteries must be filled from the aorta; but if it be not true, those vessels are filled by the heart's action directly. On this question I purpose making some short remarks.

Martin and Sedgwick have thrown some doubt upon the usual teaching of coronary circulation; but as their experiments are not very convincing, and only apply to one aspect of the question, it is necessary to look into it somewhat more fully.

Let us begin our view of the circulation in the coronary arteries at that stage of the heart's action when the left ventricle is dilated, the semilunar valves firmly closed, and the aorta contracting upon its contents and propelling them in any direction where there is an exit. At this stage of the circulatory movements the aorta steadily presses the blood onward through the system, as into the branches of the carotids and subclavian. Now, the coronary arteries stand to this action of the aorta in precisely the same relationship as do the branches of the above-named vessels. When the aorta contracts upon its contents the blood would flow back into the ventricle were it not for the valves. This, however, being prevented, the blood passes on into the various branches and sub-branches of the aorta. Among these the coronary arteries come in, and the blood is steadily driven through them in the same manner as it is through any other arterial trunk in the body. This action is not dependent directly upon the contraction of the heart and upon the action of the aorta secondary to it.

Let us now proceed a step further in the chain of events, and note carefully what takes place. The aorta is still firmly contracted upon its contents, the semilunar valves are completely closed, and the entrance to the coronary arteries are open. The ventricles now contract. At the moment this action begins, the blood is pressed firmly against the ventricular side of the valves, and the central points of these fall back first, and permit some of the blood in