The pattern of the inflow curves, in the normally beating preparation, suggests that the systolic rise of aortic pressure produces a rapid forward progression of blood in the auricular artery. During ventricular diastole, the flow is less rapid than in systole but is somewhat more sustained. Forward flow is momentarily interrupted at the onset of ventricular systole and diastole, coincident with rapid changes in aortic pressure. Generally there is a sharp backflow from the auricular artery during the rapid fall of aortic blood pressure, early in ventricular diastole.

The diminution of inflow into the auricular artery accompanying elevation of left intraauricular pressure appears to result from changes in the resistance in the auricular vascular bed, since cardiac output and blood pressure were maintained during the period of mild heart failure. It has been suggested that stretching of the cardiac walls may attenuate the intramural vessels, diminishing their capacity.[8] Spalteholz[9] and Unger[10] have shown that the greater part of the venous blood from the left auricle passes by vein to the coronary sinus, but that numerous Thebesian veins exist to account for the escape of a portion of venous blood directly into the auricular cavity. Therefore, a rise of intra-auricular tension may diminish venous outflow from the Thebesian vessels. More probably the distension of the atrial wall exerts pressure upon all of the intramural vessels preventing the free passage of blood through them.

The results of these experiments warrant the suggestion that distension of the auricles, (*e.g.*, resulting from heart failure or valvular disease) may curtail the blood supply to the auricles, favoring the development of auricular fibrillation or other auricular arrhythmias.[2]

Summary. The flow of blood into the left anterior auricular artery was measured phasically and quantitatively in the heart-lung preparation. The curves indicate that forward flow into the auricular artery occurs during ventricular systole and diastole, with abrupt, momentary interruptions of inflow at the onset of ventricular systole and diastole. Elevation of tension within the left auricle diminishes auricular arterial inflow; inflow again increases as pressure within the auricle is restored to normal levels. It is suggested that the interference with auricular blood supply, due to increased intra-auricular tension (as in heart failure) may enhance the establishment of aberrant auricular mechanisms.

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Pyroninophilic Structures of Liver Cells in Carbon Tetrachloride Poisoning.

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The present report is concerned with changes in the pyroninophilic structures of the liver cell, as an early effect of carbon tetrachloride poisoning.

In the hepatic cells of various mammals and lower animals a peculiar type of granulation has repeatedly been observed and described.[1] These structures are characteristic in that they stain an intensive red with methyl green-pyronin (Pappenheimer's meth-

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od). They vary in size and shape and may have the form of spheres, plump rods or lumps. They are often accumulated in the immediate neighborhood of the nucleus, but occasionally are spread over the entire cytoplasm. There is a clear relationship between the pyroninophilic granule content of the liver cells and the nutritional state of the animal. In livers of fasting animals or in animals fed on carbohydrate or fat only the pyroninophilic structures disappear; in animals kept on a diet rich in proteins and products of protein cleavage they are especially numerous. The pyroninophilic granules can be digested by protein splitting ferments; they give positive Millon's, ninhydrin, diazo, and nitroprusside reactions. These facts led Berg to conclude that the pyroninophilic structures are paraplasmatic accumulations of proteins with a substantial proportion of lower degradation products. According to this author changes in the size and number of pyroninophilic granules are an indication of a disturbed protein metabolism.

The views of Berg were corroborated by a number of investigators.[2-9] Various authors[10-14] have opposed his opinions. Kremer[15] held the pyroninophilic structures to be the products of biliary secretion. The histochemical studies of Brachet[16] and of Biesele[17] made it probable that the structures observed by Berg contain ribonucleic acid as an essential component.

Few studies have been made on pyroninophilic structures under pathological conditions. It has been claimed[18] that in human livers showing cloudy swelling the pyroninophilic material is augmented. In livers of patients dying with severe infections, a marked increase of pyroninophilic granules could be observed.[19]

It has been further noted that administration of adrenalin as well as insulin considerably reduces the amount of pyroninophilic granulations.[3,5,7] Recently Korenchevsky[20] described a decrease in number and size of the pyroninophilic granules in gonadectomized rats, and a return to normal after injection of sex hormones.

In the present investigation we used young albino rats kept on a balanced diet, rich in proteins. Chemically pure carbon tetrachloride was given intraperitoneally in an amount of 0.1 ml per 100 g of body weight. The animals were sacrificed after various intervals. The liver samples were fixed in Zenker's and Carnoy's fluids immediately after removal and embedded in paraffin. The sections, 5 μ thick, were stained with methyl green-pyronin, according to Pappenheimer.

In the liver of normal uninjected rats fed on our standard diet, sufficient in every respect, pyroninophilic structures were invariably present in practically every hepatic cell. They were numerous, of varying size and shape and were fairly evenly distributed throughout the hepatic lobule. The aspect was quite different after administration of carbon tetrachloride. In the animals sacrificed one hour after injection of carbon tetrachloride the pyroninophilic granules in the periphery and the middle zone of the

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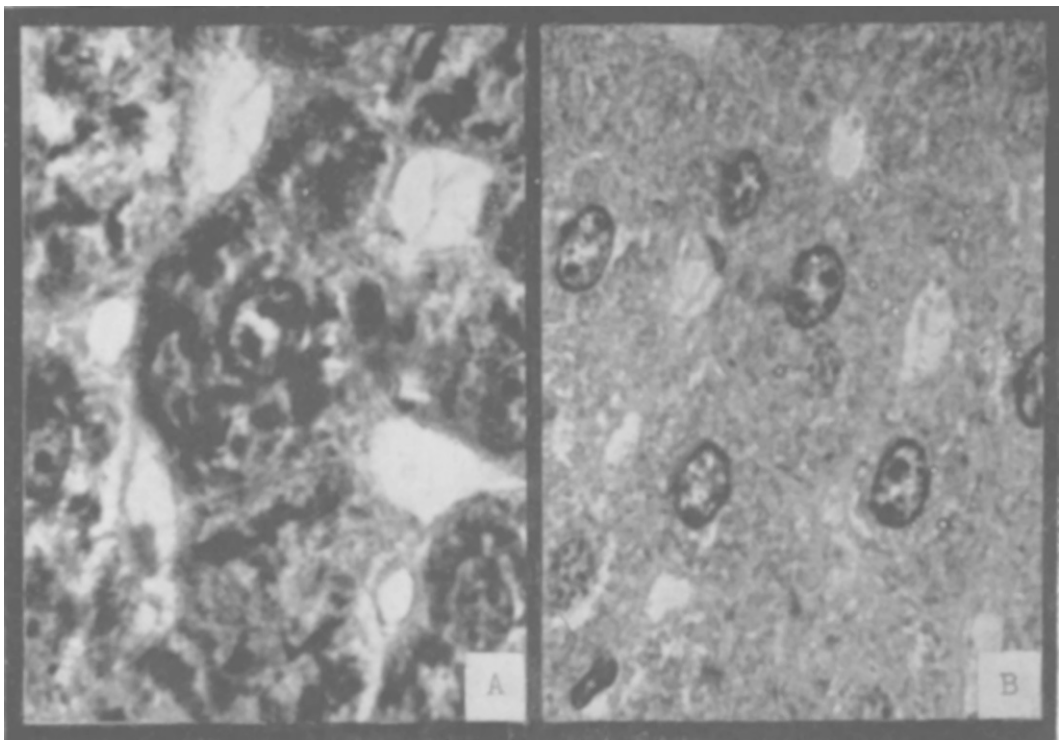

FIG. 1.
Liver of the rat (No. 293) sacrificed 1 hour after the injection of carbon tetrachloride. Fixed in Carnoy's fluid. Stained with methyl green-pyronin.
A. Liver cells from the periphery of the lobule. Mag. × 1900.
B. Liver cells from the central part of the lobule. Mag. × 1500.

lobule were essentially normal in size, distribution and number. In contrast, in the central zone of the lobule the parenchymal cells were free from pyroninophilic material and no traces of red granules could be identified. The line of demarcation between the empty central areas and those containing pyroninophilic granules is sharp. At this period no other noteworthy alterations were observed in the liver parenchym of the treated rats.

Summing up, the administration of carbon tetrachloride, as early as one hour after injection, brings about an alteration of the pyroninophilic structures, leading to their complete disappearance in the hepatic cells in the central part of the lobule. Inasmuch as the nature of the pyroninophilic structures is still a subject of discussion, no conclusive evidence pointing to the significance of these changes can be presented at time. If Berg's concept is correct, the early disappearance of the pyroninophilic granules in liver cells after injection of carbon tetrachloride can be regarded as a proof that disturbed protein metabolism in liver cells is one of the very earliest effects of carbon tetrachloride poisoning.