to be propagated more slowly in the mammalian auricle. The hydrogen ion concentrations of our solutions unfortunately were not determined. Tachycardia has been observed much less often, although it has been noted on 19 occasions in the hearts of the turtle, rabbit, cat and dog. Brull regarded bradycardia as always the change in rate produced by calcium administration. The systolic death noted in the frog's heart was absent in a series of 42 experiments upon rabbits and dogs, according to the latter author's results. The state of ventricular arrest in our perfusion experiments was possible of recording upon the kymographic tracing, where the increasing tension of a rising ventricular tonus produced at the end of the experiment a vertical upstroke upon the smoked paper. This observation was verified in each instance by palpation of the ventricle and by actual measurement of its diastolic and systolic diameters with calipers. In 33 rabbits' hearts examined in this manner, the characteristic and practically constant effect has been a cessation of the heart's action in systole with a well marked calcium rigor. The failure of this effect in the perfused heart of the rabbit following treatment with calcium we believe to indicate the absence of the opportunity for the complete calcium action to have exerted itself upon the ventricular muscle.

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Anticomplementary Action of Purified Heparin.

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The writers, in a previous paper,[1] reported on the anticomplementary action of heparin. It was found that the antihemolytic effect is not due to an action upon the erythrocytes. Although an ancillary action upon amboceptor could not be excluded, the action was found to be upon the complement. Further investigation demonstrated that the anticomplementary effect of heparin is due to its interference with the heat-stable factor or the so-called third component of complement. Complement inactivated by heat and by NH_3, containing in both instances the third component, reactivates heparin-inactivated complement. Previous admixture of a small

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[1] Ecker, E. E., and Gross, Paul, *J. Infect. Dis.*, (in press).

amount of calcium to heparin destroys its anticomplementary activity without interfering with its anticoagulant action. It was found that a large amount of heparin is required to inhibit complement, many times the dose that will render a corresponding amount of blood incoagulable. This is also pointed out by Hyde.[2] Intracardiac injections of guinea pigs with as much as 50 mgm. of heparin led to incoagulability of the blood without impairment of complement titer. An anticomplementary action of heparin is reported by Fuchs and Hartman.[3] Prof. Howell's announcement[4] of the preparation of N-free heparin, suggested an investigation to determine whether or not the anticomplementary power is due to heparin *per se* or to the impurities associated with it. Furthermore, the possibility that the anticoagulant effect and the anticomplementary power depend upon 2 different mechanisms also indicated more work in that direction.

Through the courtesy of Prof. Howell, who kindly prepared for us a small amount of purified heparin, and to whom we are much indebted, we are enabled to report results obtained with the purified product. The anticomplementary power of purified heparin was retained and the action was again found to be upon the heat stable fraction of the complement. Complement, inactivated by heat and by NH_3, reactivates the complement inactivated by purified heparin. While 0.18 mgm. of the crude heparin inactivated one unit of complement, 0.013-0.018 mgm. of the purified product produced the same effect. The anticomplementary power of the purified heparin was increased about 10 fold. The anticoagulant power, however, sustained a 20 fold increase by the process of purification. Prof. Howell, in this instance, obtained 0.060 gm. N-free heparin from 3 gm. commercial heparin. Weight for weight, the purified product is from 10 to 20 times more active than the original preparation.

Conclusion: Heparin, purified by the recent method of Howell, operates upon complement in the same qualitative manner as does unpurified heparin, namely upon the third component. The amount of purified heparin necessary for effect is much reduced as compared with the unpurified product. The purified product is definitely increased in activity.

[2] Hyde, R. R., *Am. J. Hygiene*, 1928, viii, 859.

[3] Fuchs, H. J., and Hartman, E., *Ztschr. f. Imm.*, 1928, lviii, 1.

[4] Howell, W. H., *Bull. Johns Hopkins Hosp.*, 1928, xlii, 199.