incubated at 37°C for 14 days. Growth was noted at various intervals. The results of this experiment are presented in Table II. It is noteworthy that both phage-resistant *E. coli* and *S. dysenteriæ* on subculture proved to be susceptible to the bacteriostatic action of sulfanilamide and sulfapyridine. It remains to be seen whether *in vivo* administration of both bacteriophage and sulfanilyl-guanidine —a drug of promise in the treatment of localized bacillary infections of the intestinal tract (Marshall[3])—or other sulfanilamide derivatives may be more efficacious than treatment with either agent alone.

Summary. (1) Sulfanilamide, sulfapyridine and sulfathiazol either completely inhibit or definitely delay the development of phage-resistant staphylococci in broth. (2) Sulfanilamide, sulfapyridine, sulfadiazine, and sulfanilyl-guanidine may delay the secondary growth of *S. dysenteriæ* (Shiga) and *E. coli* in broth containing bacteriophage. (3) The phage-resistant bacilli were found to be susceptible to the bacteriostatic action of sulfamido compounds.

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Plasma Clotting Time and Serum Calcium of Patients Recovered from Attacks of Coronary Thrombosis.

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It has been suggested that it is possible to predict among those patients who have undergone surgical operation those who are likely to have thrombosis or embolism by detecting a decreased clotting time of the blood plasma.[1] The same authors also thought that it might be possible to alter the clotting time of the blood by appropriate diet and by administering sodium thiosulfate. In view of the above considerations, it seemed worth while to investigate the

[3] Marshall, E. K., Braton, A. C., Edwards, L. B., and Walker, E., *Bull. Johns Hopkins Hosp.*, 1941, **68**, 94.

[1] Bancroft, F. W., Stanley-Brown, M., and Quick, A. J., *Am. J. Surg.*, 1935, **28**, 648.

possibility that patients who are subject to attacks of coronary thrombosis might show a tendency to a more rapid clotting of the blood. Sixteen patients recovered from such attacks were compared with 14 of the same age group who did not have any complications of the heart.

Methods. Owing to the fact that the plasma clotting time is influenced by what appear to be negligible factors, it is necessary to describe rather fully the experimental technic.

All tubes and syringes were brushed with soap and water, rinsed with cleaning solution, then with tap water repeatedly, and finally with distilled water. Clean syringe needles were boiled in distilled water and dried in an oven.

0.5 cc of 0.1 M sodium oxalate solution was measured into a 15 cc centrifuge tube. About 12 cc of blood were drawn as rapidly as possible and with special care to avoid contamination with tissue juice. 4.5 cc of blood were immediately transferred to the centrifuge tube by running it down the sides so as to prevent injury to the cells. The tube was then quickly inverted over a rubber stopper to mix the blood with the oxalate solution and centrifuged at about 1,400 r.p.m. for 5 minutes, after which the plasma was removed from the cells with a capillary pipette. The remainder of the blood from the syringe was centrifuged and a calcium determination made on the serum by the Clark-Collip[2] modification of the Kramer-Tisdall method.

The thromboplastin was prepared according to the directions of Quick.[3] The brains of 5 freshly killed rabbits were ground together, spread on gauze and dried. The emulsion was freshly prepared each day by leaching 1 piece of the gauze (representing 1 g of the fresh brain) in 10 cc of normal NaCl solution.

For the determination of the plasma clotting time, 2 drops of the oxalated plasma were delivered into a 13 x 100 mm test tube and warmed for 1 minute in a 37°C constant temperature water bath. Two drops of 0.1 M calcium chloride solution, a bottle of which was kept warm in the water bath, were then added and the stop watch instantly started by an assistant. The tube was kept in the bath for 1 minute from the time the calcium chloride solution was added, then taken out for inspection, as 5-second intervals were called, until the formation of the clot occurred. At least 3 tests were made of each specimen. If these 3 tests checked within 5 seconds, the average was designated the plasma clotting time. If there was

2 Clark, E. P., and Collip, J. B., *J. Biol. Chem.*, 1925, **63**, 461.

3 Quick, A. J., *Am. J. Physiol.*, 1935-36, **114**, 282.

a greater difference in the time for the first 3, the test was repeated until close checks were obtained in triplicate.

The prothrombin time was determined by adding 2 drops of plasma and 2 drops of the thromboplastin emulsion to the small tube and warming in the water bath for 1 minute. Two drops of 0.1 M calcium chloride solution were then added and the warming continued for 10 seconds by the stop watch. When the 10-second time was called by the assistant, the tube was removed and the clotting time was recorded as observed. The average of 3 readings which checked closely was taken as the prothrombin time.

TABLE I.
Plasma Clotting Time and Serum Calcium of Controls and Cases of Thrombosis.

Determination	Max.	Min.	Mean	Max.	Min.	Mean	No. of cases
	——— sec. ———			—— mg per 100 cc —			
Prothrombin time	19.7	16.2	17.4				14 controls
Plasma clotting time—							
appearance of fibrin	95	80	83.3				
formation of clot	100	86	90.7				
Serum calcium				10.8	9.9	10.5	
Prothrombin time	19.8	16.8	17.9				16 thrombosis
Plasma clotting time—							
appearance of fibrin	91	78	82.2				
formation of clot	110	81	95.4				
Serum calcium				11.5	10.2	10.9	

Results and Conclusions. The data presented in Table I show that there was no significant difference in the prothrombin time, in the plasma clotting time as indicated by the appearance of fibrin, or in the serum calcium content of the blood serum of persons who had suffered attacks of coronary thrombosis when compared with a group of controls. There was a difference in the interval between the appearance of fibrin and the formation of a solid clot of 7.4 seconds in the control series and of 13.2 seconds in the group of thrombosis cases. This difference was found to be significant when analyzed by the *t* test of Fisher.[4] Since the time for the appearance of fibrin was practically the same for the 2 groups, this means that the blood of the thrombosis patients did not form a solid clot so readily as did that of the controls. Obviously, this difference indicates a tendency to a longer and not a shorter coagulation time of the blood of patients who have had attacks of coronary thrombosis.

[4] Fisher, R. A., *Statistical Methods for Research Workers*, London and Edinburgh, 6th Edition, 1936.