of hay were tried. These were the Middle Park, North Park and Gunnison types of hay and alfalfa. It was possible to maintain guinea pigs in a good state of nutrition with any one of these varieties of hay without any signs or symptoms of scurvy.

It appears likely that some varieties of hay contain considerable amounts of vitamin C. Since some workers have used hay for roughage, with their basal diets, in the belief that hay contained little if any ascorbic acid, it was thought these results should be reported.

8990 C

Effect of Ascorbic Acid on Resistance of Suprarenalectomized Rats to Histamine.

DAVID PERLA.

From the Laboratory Division, Montefiore Hospital, New York City.

The removal of the suprarenal glands in rats is followed by a drop in resistance to certain poisons, to toxins and to bacterial and protozoan infections.* This drop is due essentially to the removal of the cortex, since the natural resistance may be raised almost to the normal by repeated injections of cortin.[2] With the discovery of the presence in large amounts of ascorbic acid in the cortex[3, 4] and its subsequent availability in synthetic crystalline form, an effort was made to determine the rôle of this factor in the resistance of suprarenalectomized animals. Szent-Györgyi had mentioned some years ago that it could not prolong the life of suprarenalectomized animals, nor did it influence the course of Addison's disease (except in modification of pigmentation).

Seventeen suprarenalectomized adult albino rats (3 months of age) were injected daily intraperitoneally with 10 mg. of ascorbic acid dissolved in physiological salt solution and brought to a pH of 7.5 immediately before injection. The injections were continued during a period of 8 days. On the 8th day, the 17 rats together with 14 untreated suprarenalectomized rats, all received

* For a survey of this subject, see the review by Perla and Marmorston.[1]

1 Perla, D., and Marmorston, J., *Arch. Path.*, 1933, **16**, 379.

2 Perla, D., and Marmorston-Gottesman, J., PROC. SOC. EXP. BIOL. AND MED., 1931, **28**, 650.

3 Szent-Györgyi, A., *Biochem. J.*, 1928, **22**, 1387.

4 Svirbely, J. L., and Szent-Györgyi, A., *Biochem. J.*, 1932, **26**, 865.

about one killing dose of histamine (ergamine acid phosphate) that is, 200 mg. per kilo of body weight. All the rats in both groups died within a few hours.

No protective effect against histamine poisoning was observed in suprarenalectomized animals repeatedly injected with an excess of ascorbic acid. It is probable that the altered natural resistance of suprarenalectomized rats is in no part due to a loss of ascorbic acid, nor can it be modified by an excess availability of the same.

Conclusion. It is suggested that the removal of the large store of ascorbic acid found in the cortex of the suprarenal gland is in no way responsible for the depression in resistance following suprarenalectomy.†

8991 P

Is Heparin an Antiprothrombin?

ARMAND J. QUICK.

From the Department of Pharmacology, Marquette University School of Medicine, Milwaukee.

Heparin while not itself an antithrombin will react with an unknown substance in the plasma to form a strong antithrombin.[1] Obviously it is essential to eliminate or correct for this antithrombic reaction in any experiment designed to determine whether heparin can also act as an antiprothrombin. A simple means to accomplish this has been found. Eagle[2] has shown that by passing carbon dioxide through plasma diluted with distilled water, prothrombin with some fibrinogen and a small amount of other constituents are precipitated. This precipitate when dissolved and neutralized is readily converted to thrombin by the addition of calcium. If heparin is an antiprothrombin it should prevent this conversion. The details of the experiment and the results are as follows:

Ten cc. of oxalated human plasma were diluted with 100 cc. cold distilled water and carbon dioxide bubbled through for 10 minutes. The precipitate was removed by centrifugation, dissolved in 8 cc. of normal saline, neutralized to pH 7.0, diluted to 9 cc., and divided

† This is not, however, inconsistent with the evidence that vitamin C may play an important rôle in the natural resistance of certain animal species to infection. (See review on vitamin C and resistance by D. Perla and J. Marmorston, in press.)

1 Howell, W. H., and Holt, E., *Am. J. Physiol.*, 1918, **47**, 328.

2 Eagle, H., *J. Gen. Physiol.*, 1935, **18**, 531.