K supplementation without preventing hemorrhages and death, is evidence that hypoprothrombinemia is not the primary cause of hemorrhages and of cottonseed meal toxicity. This affords an interesting parallel to the conclusion of Schofield(5) regarding hemorrhagic sweet clover disease long before Dicumarol was isolated and characterized.

Summary. Gossypol induces hypoprothrombinemia in rabbits and pigs. Cottonseed meal containing free gossypol induces hypoprothrombinemia in young rabbits which begins after about 7 days feeding and passes through a maximum at approximately 17 days then slowly returns to normal around 28 days. Gossypol is not as effective an anticoagulant as Dicumarol but acts somewhat more rapidly.

5. Schofield, Frank W., *J. Am. Vet. M. A.*, 1923-24, N.S. 17, 553.

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Failure of Aureomycin in Treatment of Experimental Leishmaniasis (18757)

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Aureomycin has recently been demonstrated both experimentally and clinically to be effective against amebiasis(1-4), trichomonas vaginalis vaginitis(5) and malarial infestations(6,7). It is, therefore of interest to know whether this antibiotic will also act on another parasitic infection, namely, Leishmaniasis (*Leishmania donovani*).

Materials and methods. Chinese hamsters, weighing 20 to 30 g each, were infected by intraperitoneal injection of 0.2 ml of a saline suspension of leishmania, prepared by mixing 30 ml of sterile saline solution with a finely ground spleen, freshly removed from a heavily infected hamster. The animals were divided into 2 groups and each group was further divided into 3 subgroups of 20 animals each. Aureomycin* was given intraperitoneally twice a day, *i.e.* 9 a.m. and 5 p.m., for 5 days for group A, for 10 days for group B. For the former, treatment was started immediately after the injection of leishmania, and for the latter, the antibiotic was not given until 2 months after infection. The dosage schedule of aureomycin was carried out according to the following plan:

Subgroup 1. 3 mg per animal per day.

Subgroup 2. 1.5 mg per animal per day

Subgroup 3. 0.5 ml normal saline per animal per day and served as infected, untreated controls.

Results. During the period of treatment, 8 hamsters in group A-1 and 10 in group B-1 died, apparently due to drug intoxication: Post-mortem examination of those animals revealed the presence of hemorrhages in the lungs with extensive peritoneal adhesions. All the rest survived and were killed 2 months after the completion of the treatment. The degree of parasitization was determined by the microscopic examination of the smears made from spleens at autopsy. Results obtained during the present investigation failed

1. McVay, L. V., Laird, R. L. and Sprunt, D. H., *Science*, 1949, v109, 590.

2. Fuller, F. W., and Faust, E. C., *Science*, 1949, v109, 509.

3. Most, H., Miller, J. W., and Grossman, G. J., *Am. J. Trop. Med.*, 1950, v30, 491.

4. Armstrong, T. G., Wilmot, A. J. and Elsdon-Dew, R., *Lancet*, 1950, July 1, 10.

5. McVay, L. V., Laird, R. I., Flanagan, J. B., and Sprunt, D. H., PROC. SOC. EXP. BIOL. AND MED., 1949, v72, 674.

6. Coatney, G. R., Greenberg, J., Cooper, W. C., and Trembley, H. L., PROC. SOC. EXP. BIOL. AND MED., 1949, v72, 586.

7. Cooper, W. C., Coatney, G. R., Imboden, Jr., C. A., and Jeffery, G. M., PROC. SOC. EXP. BIOL. AND MED., 1949, v72, 587.

* The aureomycin used in this study was supplied by Lederle Laboratories Division of American Cyanamid Co., N. Y.

to show any appreciable difference between the treated and untreated animals of both groups. All the surviving animals were shown to be heavily infected with L.D. bodies and their spleens were uniformly found to be enlarged. It may thus be concluded that aureomycin in a dose as high as 100-150 mg per kilo body weight per day failed to exert any beneficial effect upon experimental Leishmaniasis in Chinese hamsters.

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The Effect of Protein Depletion upon the Enzyme Activities of Organs.* (18758)

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The gross attributes of the syndrome of protein depletion in animals are now generally recognized; perhaps less evident are the underlying metabolic changes. One approach to this problem has been a study of the nitrogen exchange of the body during depletion(1,2). The activities of enzyme systems, which ultimately may dictate the major features of depletion, constitute another approach to the deeper mechanisms involved. Therefore this study was designed to screen some of these systems in rats on low-protein and protein-free diets.

Depletion of animals. Young adult albino rats were housed in self-cleaning cages in an air-conditioned room. The control diet "G" was composed of 18% casein, 68% dextrose, 8% hydrogenated vegetable oil, 4% salts (USP No. 1), and 2% cod liver oil. Low-protein diet "E" contained only 2% casein, while diet "D" was protein-free; in both these cases the dextrose content was increased to substitute for the protein omitted. In addition, the rats were fed orally an adequate daily supplement of pure vitamins, which included the "B" components, para-amino benzoic acid, choline, inositol, 2-methyl-1,4-naphthoquinone and biotin.

The rats were maintained on these diets for varying periods, depending upon when their tissues were analyzed for enzyme activity. Although it was originally planned to examine for a gradual change in such activity with time, it was noted on examination of the data that any changes which did occur were of the same order of magnitude after 3 weeks of depletion as they were later on. For this reason, the depletion values have been grouped for analysis and comparison with the simultaneously measured control values. Tests of significance were performed, where possible, by the 't' test(3). In the determination of enzyme activity maximum effort was directed toward making analyses under identical conditions. Thus strict time schedules were observed for autopsy, treatment of tissue and measurements. Especial care was taken with homogenization of the tissues which was always performed in the same manner(4).

Adenosinetriphosphatase (ATP-ase) of skeletal muscle. Analyses were performed according to the method of Dubois and Potter (5); the adenosine triphosphate was prepared according to Kerr(6). In Table I are re-

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1. Allison, J. B., and Anderson, J. A., *J. Nutrition,* 1945, v29, 413.

2. Allison, J. B., Anderson, J. A., and Seeley, R. D., *Ann. N. Y. Acad. Sci.,* 1946, v47, 245.

3. Fisher, R. A., *Statistical Methods for Research Workers,* Oliver and Boyd, Edinburgh, 1936.

4. Potter, V. R., and Elvehjem, C. A., *J. Biol. Chem.,* 1936, v114, 495.

5. Dubois, K. P., and Potter, V. R., *J. Biol. Chem.,* 1933, v150, 185.

6. Kerr, S. E., *J. Biol. Chem.,* 1941, v139, 121.