and also that a single renal monoesterase rather than multiple esterases is involved.

In general, our results confirm those reported with the Gomori[3] and the Takamatsu[4] technic. Minor differences, however, were observed, such as the presence of phosphatase in the glomerulus in contrast to its absence in this structure reported by Kabat and Furth.[5] In the study of a series of miscellaneous animals Wilmer[6] recently reported phosphatase in the glomeruli of the cat and the chicken, so that enzyme activity in this structure undoubtedly varies in different species.

It is interesting that the mouse is the only one of the 3 species studied by us in which the dye appeared in large amounts in the capsular lining which is uniquely of columnar type epithelium in this animal. The presence of the enzyme in this position, as well as in glomerulus, raises the question whether phosphatase activity and the metabolic processes with which it is associated may not be instituted at a higher structural level in the nephron of certain species than of others.

The occasional clear-cut demonstration of phosphatase in the mitochondria of the proximal convoluted tubules suggests that these cellular structures are functionally related to or are associated with the development of this enzyme in the kidney. Recently, Breedis, Flory, and Furth[7] and Wilmer[6,8] have noted that pathologic changes in the cytoplasm of the proximal convoluted tubules result in loss and disappearance of the phosphatase from their lumina. This observation gives support to the belief that the mitochondria may be the site of origin of the renal alkaline phosphatase.

Summary. The location of the alkaline phosphatase in the kidney of the rat, mouse, and human shown by the use of a histochemical azo dye test is mainly in the proximal convoluted tubule. This distribution agrees substantially with that obtained by the silver technic of other investigators. Minor differences in the enzyme distribution in the three species are described.

Thanks are due to Dr. Mortimer Cohen and Miss Ann Shiras for making the photomicrographs.

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[4] Takamatsu, H., *Tr. Jap. Path. Soc.*, 1939, **29**, 492.

[5] Kabat, E. A., and Furth, J., *Am. J. Path.*, 1941, **17**, 303.

[6] Wilmer, H. A., *Arch. Path.*, 1944, **37**, 227.

[7] Breedis, C., Flory, C. M., and Furth, J., *Arch. Path.*, 1943, **36**, 402.

[8] Wilmer, H. A., *J. Exp. Med.*, 1943, **78**, 225.

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Studies in Hodgkin's Syndrome. II. A Search for Brucella in Hodgkin's Syndrome.*

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The coexistence of Brucella infection and Hodgkin's syndrome has been reported by Parsons and Poston[1] and Forbus[2] in a series of 24 cases studied by them at Duke University. The strains of Brucella which were obtained induced a mild infection when inoculated into experimental animals. There was an atypical distribution of lesions described, from which Brucella were not regularly recoverable. Specific agglutinins could not be

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[1] Parsons, P. B., and Poston, M. A., *Southern Med. J.*, 1939, **32**, 7.

[2] Forbus, W. D., *Am. J. Path.*, 1942, **18**, 745.

TABLE I.

	Patients	Nodes	Spleens	Blood	Miscel. cultures	Postmortem study	Original cultures	Subcultures
Hodgkin's disease	35	40	2	75	24	5	725	4050
Controls	36	23	9	22	3	none studied	216	1296

demonstrated[3] in inoculated experimental animals. The suggestion was made that brucellosis may influence the course of Hodgkin's syndrome or be associated in some manner with its etiology. The testing of this hypothesis in another geographic area was the objective of the studies reported in this paper.

In a series of distribution studies Hoster[4] has recently shown that the mortality statistics of Hodgkin's disease in the United States parallel neither the mortality of human brucellosis nor the incidence of brucellosis in cattle.

Methods. At the inception of our investigation of this phase of the Hodgkin's problem, one of us visited Durham, N.C., and through the kindness of Dr. Forbus, was given the opportunity of discussing methods, observing technical details, and studying fixed tissue sections with members of the group who participated in the Hodgkin's-Brucella studies carried on in the Departments of Medicine and Pathology at Duke University.

Using the method described by Poston[5] for the isolation of Brucella from tissue and body fluids, we have studied a series of 71 patients, 35 with histologically verified Hodgkin's granuloma, and 36 with miscellaneous diseases involving the reticulo-endothelial system. The geographic distribution of patients is centered in Ohio and includes a few of the neighboring north central states. Bacteriologic studies have included cultures from nasal and throat secretions; from urine and blood; from aseptic surgical specimens of liver, spleen, lymph node, and bone marrow; from postmortem samples of spleen, lymph node, and liver; and from other miscellaneous sources. (Table I.)

The group classified under miscellaneous diseases involving the reticulo-endothelial system included monocytic leukemia, myelogenous leukemia, Cohnheim's sub-leukemic lymphatic leukemia, lymphosarcoma, metastatic carcinoma, Banti's disease, polycythemia vera, aplastic anemia, pan-splenic hematopenia, infectious mononucleosis, congenital hemolytic icterus, reticulo-endotheliosis, granuloma of unknown etiology, tuberculosis, chronic brucellosis, and fungus disease.

Results. No organisms identified as belonging to the Brucella group were isolated during the course of the present study. There were 3 patients with Hodgkin's granuloma whose brucellergin skin tests were positive after 48 hours; none, however, showed a significant agglutinin titer for Brucella and none developed an elevation of opsonocytophagic index[6] which was considered significant.

From 3 of 6 Hodgkin's patients available for intensive study during the 6-months period prior to death, large, gram negative, cocco-bacilli were obtained in pure culture. Two strains were isolated from the blood stream and one from the spleen. The morphological, serological, and cultural characteristics of the organisms could not be confused with Brucella. Selected patients were skin tested with antigens made from the 3 strains isolated, and no difference in the cutaneous reactions of individuals in the 2 groups could be observed. Using each isolated strain as a separate antigen, it has been noted that serum agglutinin titers were higher in some of the Hodgkin's granuloma patients than in those of the control group. Though further bacteriologic and immunologic studies are being carried out, the organisms isolated are considered to be of questionable etiologic significance, similar perhaps to that of Brucella in Hodgkin's disease.

Summary and Conclusions. An unsuccessful attempt has been made to isolate bacteria

[3] Forbus, W. D., and Gunter, J. U., *Southern Med. J.*, 1941, **34**, 376.

[4] Hoster, H. A., *Ohio J. Science*, 1944, **44**, No. 6.

[5] Poston, M. A., *J. Lab. and Clin. Med.*, 1941, **26**, 1961.

[6] Foshay, L., and LeBlanc, T. J., *J. Lab. and Clin. Med.*, 1937, **22**, 1297.

of the Brucella group from 35 patients with Hodgkin's disease and from 36 patients with miscellaneous diseases of the reticulo-endothelial system. Three strains of gram negative cocco-bacilli not belonging to the genus Brucella have been isolated.

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In Vitro Inhibition of Mycobacteria by Streptothricin.

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Aside from penicillin, streptothricin is the only antibiotic whose pharmacologic properties indicate a suitability for general use in the animal organism.[1,2] Interest in the development of an antituberculosis agent of microbiological origin led to *in vitro* tests of the efficacy of the only 2 antibiotics known which at present could possibly be of general use in animals or humans, namely, penicillin and streptothricin.

Various species of mycobacteria were totally resistant to the action of penicillin, even as

TABLE I.
Inhibition of Mycobacteria by Streptothricin.

Exp. 1. Long's medium. 6 weeks' incubation

	Units per ml			
	0	.3	1	3
M. tuberculosis (avian)	+	+	±	—

Exp. 2. Nutrient agar—pH 7.0. 4 days' incubation

	Units per ml				
	0	0.1	1.0	10.0	100
M. tuberculosis (hominis 607)	+	+	±	—	—
M. leprœ P.	+	+	—	—	—
M. smegmatis I.M.	+	+	±	—	—
M. smegmatis Tol.	+	+	±	—	—

Exp. 3. Long's medium—pH 8.0.
4 days' incubation

	Units per ml						
	0	0.1	0.2	0.3	0.4	0.6	1.4
M. tuberculosis (hominis 607)	++	+	±	—	—	—	—
M. leprœ P.	++	++	—	—	—	—	—
M. smegmatis I.M.	++	±	—	—	—	—	—
M. smegmatis Tol.	++	+	±	±	—	—	—

8 days' incubation

	Units per ml							
	0	0.1	0.2	0.3	0.4	0.6	1.0	1.4
M. tuberculosis (hominis 607)	++	++	++	++	++	+	—	—
M. leprœ P.	++	++	++	++	++	±	—	—
M. smegmatis I.M.	++	++	++	++	++	++	±	—
M. smegmatis Tol.	++	++	++	++	+	—	—	—

No change at 14 days.

\+ = growth.
± = poor growth.
— = no growth.

[1] Metzger, H. J., Waksman, S. A., and Pugh, L. H., PROC. SOC. EXP. BIOL. AND MED., 1942, **51**, 251.

[2] Robinson, H. J., Graessle, O. E., and Smith, D. G., *Science*, 1944, **99**, 540.