resulted in a similar 1-methylhistidinuria. Dietary variation in the anserine content of foods thus may be responsible for the reported variations in amounts of 1-methylhistidine excreted. Control of anserine content of diets is of importance in studies of aminoaciduria or of 1-methylhistidinuria.

The mechanisms whereby anserine is digested, absorbed, and excreted are unknown. No studies of anserinase activity of human gut are available, although a muscle anserinase has been detected in other species(13). The almost stoichiometric excretion of 1-methylhistidine as urinary 1-methylhistidine, 3-methylhistidine, and histidine following ingestion of anserine by one subject suggests either that the 1-methylhistidine does not enter protein metabolism other than for demethylation or isomerization, or that it displaces histidine moieties from the amino acid pool.

One of the components of anserine, beta-alanine, is not transported by hamster intestine(14). Thus, anserine appears to be a dipeptide made up of one poorly absorbed amino acid, beta-alanine, and one amino acid, 1-methylhistidine, which is absorbed and excreted rapidly. Studies of anserine digestion should aid in elucidating various aspects of the absorption of peptides and amino acids.

Summary. Chicken fed to men and women resulted in significant increases in the amount of 1-methylhistidine excreted in the urine. The source of the 1-methylhistidine is the anserine (beta-alanyl-1-methyl-L-histidine) contained in chicken muscle.

The authors wish to acknowledge the technical assistance of Miss Lillian Tybuszewski.

1. Block, W. D., Markovs, M. E., Westhoff, W. D., Proc. Soc. Exp. Biol. and Med., 1964, v116, 736.
2. Evered, D. F., Biochem. J., 1956, v62, 416.
3. Stein, W. H., J. Biol. Chem., 1953, v201, 45.
4. Stein, W. H., Bearn, H. G., Moore, S., J. Clin. Invest., 1954, v33, 410.
5. Datta, S. P., Harris, H., Nature, 1951, v168, 296.
6. Davey, C. L., Arch. Biochem. and Biophys., 1960, v89, 296.
7. Soupart, P., Clin. Chim. Acta, 1959, v4, 265.
8. Watt, B. K., Merrill, A. L., Composition of Foods, U. S. Dept. Agric. Handbook 8, 1950.
9. Moore, S., Spackman, D., Stein, W., Anal. Chem., 1958, v30, 1185.
10. Rosen, H., Arch. Biochem. & Biophys., 1957, v67, 10.
11. Meyer, H., Biochem. J., 1957, v67, 333.
12. Snedecor, G., Statistical Methods, 5th ed., 1956, 45.
13. Jones, N. R., Biochem. J., 1955, v60, 81.
14. Lin, E. C. C., Hagihira, H., Wilson, T. H., Am. J. Phys., 1962, v202, 919.

Received November 23, 1964. P.S.E.B.M., 1965, v118.

Presence of Neutralizing Antibody for Myxovirus Parainfluenza 3 In Sheep Sera.* (29951)

H. R. FISCHMAN† (Introduced by F. B. Bang)
Department of Pathobiology, School of Hygiene and Public Health, Johns Hopkins University, Baltimore, Md.

Since 1954, when the first of the parainfluenza viruses was described, the members of this group have increased to form 4 main serologic groupings, and knowledge of their distribution in nature has expanded. Chanock *et al*(1) have reviewed the antigenic types and some of the natural hosts of these viruses. Types 1-4 all infect man, while only types 1-3 seem to possess animal analogues. Type 1 (HA-2) has a related strain, Sendai virus, which infects the pig and mouse. Type 2 (CA) has 2 related strains infecting monkeys, SV-5 and SV-41 viruses. Type 3 (HA-1) has a related strain infecting cattle, SF-4 virus. Ditchfield *et al*(2) claim the isolation of a type 3 strain from horses.

* This project was supported in part by funds from Johns Hopkins University International Center for Medical Research and Training.

†Post doctoral Fellow, NIH, USPHS.

TABLE I. Results of Examining Sera for Antibody Against Parainfluenza 3.

Species	No. tested	HI positive		TCSN positive	
Sheep	37	34/38 (89%)	(1:20–1:160)	30/37 (81%)	(1:5)
Swine	35	10/11	(1:20–1:80)	0/33	
Dog	15	3/15	(1:20)	0/3	
Cat	18	10/10	(1:20–1:80) (1 at 1:1280)	1/16	(1:256)

Hsiung's(3) antibody (HI) studies of normal animals revealed cows and goats strongly positive to all 3 types. Monkeys had a high percentage of reactors to type 3 with a small percent for types 1 and 2. Fifty percent of rabbits showed antibody for type 1, 30% were positive for type 2, and none for type 3. The guinea pig showed low percent positives for all 3 types, while the hamster was negative to all. Cook *et al*(4) have noted that some sources of guinea pigs are antibody free, intimating that the degree of human contact may be important.

This study was initiated to define further the ecological distribution of some of these viruses in domestic animals through serologic studies.

Materials and methods. Animal sera. Adult sheep and swine sera were collected from a local abattoir in which they were slaughtered within 24 hours of arrival. Dog and cat sera were collected from the University's experimental animal rooms and from cooperating local veterinarians. All sera were stored frozen until used.

Serologic tests. Hemagglutination-inhibition (HI) and tissue culture serum neutralization (TCSN) were used to determine the presence or absence of neutralizing antibodies. All sera were inactivated at 56°C for 30 minutes. They were then absorbed with 25% kaolin or treated with receptor destroying enzyme (RDE), and then absorbed with guinea pig RBC's before being tested for HI activity.

Viral agents. The human strains (Types 1-3) and the bovine strain (SF-4) were obtained from Dr. R. M. Chanock's laboratory at National Institute of Health. All viruses were routinely maintained in monkey kidney tissue culture cells obtained commercially.

Discussion. The observation in Table I of 81% positive sheep sera on TCSN with parainfluenza Type 3 certainly points to this virus as being a common infection in this species. This figure compares favorably with Abinanti's(5) observation of 80% antibody prevalence in cattle over the age of 36 months, and Kramer *et al*'s(6) study in Nebraska cattle which showed a prevalence rate of 86.2%. Chanock(7) has pointed out that 90% of U. S. human populations in his series were positive by the fifth year. La Placa and Muscovici(8) found 100% of American adults to be positive by hemagglutination inhibition. Table II suggests a closer relationship of the sheep sera antibody toward the bovine SF-4 strain rather than the human strain. Human sera did not clearly differentiate the 2 strains, confirming Ketler *et al*'s(9) observation that the bovine strain apparently has a broader antigenic structure. The one positive cat sera also could not differentiate between the 2 viruses, hinting that this infection may have been of the human type.

The lack of correlation in Table I between the HI observations in swine, dogs and cats with the TCSN is worthy of further investigation. These sera were all RDE treated. Though repeat experiments with 25% kaolin on selected sera did reduce the number of

TABLE II. HI Comparison of Positive Sera with Human and Bovine Type 3 Virus Strains.

Serum	PV 3	SF-4
Sheep–3	1:80	1:160
" 4	1:40	1:160
" 8	1:80	1:320
" 16	1:40	1:160
" 20	1:20	1:40
" 22	1:80	1:160
" 24	1:80	1:320
Cat–90	1:640	1:640
Human–M	1:160	1:160
" HI	1:160	1:80
" 63-68-1	1:640	1:320
" G	1:320	1:320
" H2	1:320	1:160
" F	1:80	1:40
" S	1:320	1:320

TABLE III. Results of Screening Sera for Antibody Against Parainfluenza Types 1 and 2 (HI Only).

Species	Para 1	Para 2
Sheep	0/5	0/9
Swine	0/5	0/9
Dog	0/15	4/10 (1:20)
Cat	N.T.	1/9 (1:20)

positives and the titers of the positives, some remained positive on HI.

Low titers to parainfluenza 2 were found in some dogs and cats (Table III) when tested by HI. All of these sera tested against parainfluenza 1 were negative.

Conclusion. Parainfluenza Type 3 neutralizing antibodies were found to be present in 81% of sheep sera tested. This points to this virus as probably being a common virus infection of sheep. The antibody appeared more closely related to the bovine strain of virus than to the human strain. Several sera from pigs, dogs and cats inhibited hemagglutination by parainfluenza 3, but failed to neutralize the virus in tissue cultures. In this series of sera examined, parainfluenza 1 and 2 did not appear to play a major role in sheep, swine, dog or cat infections.

NOTE ADDED IN PROOF: Since submission of this article, Woods *et al*(10) have confirmed the finding of HI antibodies to parainfluenza 3 in sheep and swine sera.

1. Chanock, K. M., Parrott, R. H., Johnson, K. M., Kapikian, H. Z., Bell, J. A., Conference on Newer Respiratory Diseases, Am. Rev. Resp. Dis., 1962, 152.

2. Ditchfield, V., Zbitnew, A., MacPherson, L. W., Can. Vet. J., 1963, v3, 175.

3. Hsiung, G. D., Conference on Newer Respiratory Disease Viruses, Am. Rev. Resp. Dis., 1962, 189.

4. Cook, K. M., Chanock, R. M., Am. J. Hyg., 1963, v77, 150.

5. Abinanti, F. R., Horlein, A. B., Watson, R. L., Huebner, R. J., J. Immunol., 1961, v86, 505.

6. Kramer, L. L., Sweat, R. L., Young, G. H., J.A.V.M.A., 1963, v142, 375.

7. Chanock, R. M., Bell, J. A., Parrott, R. H., Perspectives in Virology II, M. Pollard, Ed., 1961, 126.

8. La Placa, M., Muscovici, C., J. Immunol., 1962, v88, 72.

9. Ketler, A., Hamparian, V. V., Hilleman, M. R., ibid., 1961, v87, 126.

10. Woods, G. T., Sibinovic, K., Marquis, G., Am. J. Vet. Res., 1965, v26, 52.

Received November 26, 1964. P.S.E.B.M., 1965, v118.

Amino Acids of Colon and Rectum. Possible Involvement of Diaminopimelic Acid of Intestinal Bacteria in Antigenicity of Ulcerative Colitis Colon.* (29952)

ELAZAR BREGMAN AND JOSEPH B. KIRSNER
Department of Medicine, University of Chicago, Ill.

Certain aspects of ulcerative colitis suggest the possibility of an immunologic process in the pathogenesis or course of the disease(1, 2). Evidence also has been adduced that ulcerative colitis colon may be more complex antigenically than normal bowel(3). The possible antigenicity of colon may be related to biologic or biochemical changes; as a consequence of an earlier, unrecognized infection (4). In ulcerative colitis, antigenicity of colon theoretically also might result secondarily from an alteration in its composition by the disease. Although infection has not been demonstrated as a primary mechanism in ulcerative colitis, the possible involvement of microorganisms, viruses or their constituents in the pathogenesis of the disease has not been excluded. It seemed desirable, therefore, to obtain information on (a) possible differences in the qualitative amino acid composition of normal and ulcerative colitis tissue, and (b) the possible role of some metabolic products of spherophorus necrophorus, an organism frequently present in the bowel of

* These studies were supported by grants from the Nat. Inst. of Arthritis & Metab. Dis., N.I.H., and Wallach Fund for Gastrointestinal Research.