injected into the cornua during heat do not find their way into the ampullae of the oviducts. Follicular fluid may contribute to the luminal fluid but the ampullar loops have already become distended before ovulation occurs. It has been postulated that there is an increased flow of fluid from the coelomic cavity into the oviduct at the time of ovulation.[9,10] From the investigations of Alden,[11] and our unpublished data, it seems likely that the periovarial sac opening is functionally closed during the period of heat.

Summary. The water content of the uterus and oviducts of adult rats during the period of proestrus and the end of sexual receptivity has been determined. There is a significant decrease in the water content of the uterine tissue during the period of heat. No significant decrease was found in the water content of the oviducts examined during this same period.

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Coproantibody Response in Humans Following T.A.B.* Vaccination.

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(Introduced by John F. Kessel.)

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The value of coproantibody determination in the laboratory diagnosis of various enteric infections has been discussed recently by Harrison and Banvard.[1] The presence of agglutinins in feces was first described by Davies,[2] but this work was overlooked until the Russian investigators, Predpechensky and Moroz,[3] Skochko,[4] and Yampolsky, Gorfunkel and Aronina,[5] utilized the presence of fecal antibodies in the laboratory diagnosis of bacillary dysentery.

According to all previous investigators, agglutinins in the feces appear sooner than agglutinins in the blood serum in cases of actual enteric infection. This might suggest a local formation of the antibody in the tissue of the intestinal tract. Burrows and coworkers[6,7] indicate that antibody is excreted in the feces of animals and humans vaccinated with *V. cholerae* antigen. It is difficult to conceive how the subcutaneous injection of dead cells could stimulate the local formation of antibodies in the intestinal tract. Their appearance under these circumstances might indicate rather some mechanism of spill over from the blood stream. This view is substantiated in part by the observations of the Russian workers who found a high correlation between the presence of cellular exudate in the stool and fecal antibodies in cases of bacillary dysentery. Stools which contained large numbers of red blood cells and leucocytes commonly contained agglutinin in higher titer than stools which showed little or no cellular exudate. Burrows *et al.*,[7] however, emphasize that fecal antibodies reach their peak titer before serum antibody and tend to decline before the maximum serum

* T.A.B.—Typhoid, Paratyphoid A and Paratyphoid B vaccine.

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TABLE I.

Blood Serum Agglutinin Titer and Coproantibody Response in Humans Following T.A.B. Vaccination.

		Serum titer† Day				Stool titer. 0 except where indicated Day									
Subject	Organism*	0	7th	14th	24th	0	3	5	7	10	12	14	17	19	24
1	T	0	640	1280										§	
	A	0	80	640										,,	
	B	0	160	320										,,	
2	T	0	320	1280	1280					§				,,	
	A	0	160	640	1280					,,				,,	
	B	0	20	320	640					,,				,,	
3‡	T	0	0	80	320							§			
	A	0	80	640	320							,,			
	B	0	80	1280	320							,,			
4	T	20	320	320	640									8	
	A	0	80	640	640									8	
	B	0	40	80	640	5									
5‡	T	0	640	1280	160										
	A	0	160	320	320									16	
	B	0	20	160	160										
6	T	0	160	1280	1280										
	A	0	20	1280	2560										16
	B	0	80	640	2560										
7	T	0	320	640	640										
	A	0	120	320	1280										
	B	0	20	160	640										
8	T	0	160		1280										
	A	0	160		1280										
	B	0	20		640										32
9	T	20	160	80	1280		8								
	A	80	160	1280	1280									32	
	B	0	20	80	640										
10	T	40	640	640	640										
	A	0	80	640	1280										32
	B	0	40	640	640										
11	T	0	160	640	640			8							
	A	0	20	1280	640			8						32	
	B	0	0	160	640			8							
12	T	0	320	1280	2560										
	A	0	40	640	640										
	B	0	20	160	160										
13	T	40	640	1280	640										§
	A	0	80	1280	640								§	16	,,
	B	20	80	1280	1280								,,		,,
14	T	80	160	1280	1280										
	A	0	40	1280	2560										
	B	0	20	1280	2560										
15	T	40	640	1280	640								8		
	A	0	80	1280	640									64	
	B	10	80	640	1280				8						
16‡	T	0	40	320	160		§	§			16		§		
	A	0	0	160	160		,,	,,			16		,,	64	
	B	10	0	80	0		,,	,,					,,		
17	T	10	320	640	160						§				
	A	0	20	160	320						,,				
	B	0	20	320	160						,,				
18	T	160	640		1280									8	
	A	0	20		1280									64	32
	B	0	20		320									16	
19	T	80	640	1280	1280									64	
	A	0	20	1280	2560									64	
	B	0	20	640	1280										
20	T	40	640	1280	2560					32	32				
	A	10	320	1280	1280					8	64			64	
	B	0	80	1280	640					16	16				

* T—titer vs. *S. typhi;* A—titer vs. *S. paratyphi* A; B—titer vs. *S. paratyphi* B.

† Expressed as reciprocal of highest positive dilution.

‡ No history of previous T. A. B. vaccination. § No record.

titer is reached. They conclude that fecal antibody is independent of serum antibody and therefore not derived from it.

Since many of our students are routinely vaccinated with T.A.B. vaccine, it appeared to us an ideal opportunity to study the relation of vaccination and coproantibody excretion with antigens different from the cholera antigen used by Burrows.

Experimental. Twenty human volunteers were chosen for vaccination. Of this group, 7 were females and 13 males. Three of the subjects had no previous history of T.A.B. vaccination. The remainder had had no injections within the previous 2 years.

The vaccine contained 1,000 million *S. typhi* per ml, 500 million *S. paratyphi A* per ml, and 500 million *S. paratyphi B* per ml. The initial injection consisted of 0.5 ml of vaccine administered subcutaneously, followed by 1.0 ml injections, similarly administered, 7 and 14 days later.

Agglutination tests against the homologous organisms were performed using blood serum and fecal extract collected before the initial injection of vaccine, periodically throughout the series of injections and for 10 days after the final injection. The agglutination titers were determined by the usual tube technic.

The stool extracts were prepared as follows using the technic described by Harrison.[8] Morning stool specimens were collected in clean stoppered bottles the day of the test. The samples for the most part were formed or semi-formed. To each bottle approximately 2 volumes of 0.6% formalinized saline were added per volume of feces. The mixture was then homogenized in a mechanical shaker for 30 minutes and placed in the refrigerator for overnight extraction. The following morning approximately 10 ml of the mixture was placed in a centrifuge tube and spun at 3000 r.p.m. for one hour. Five ml of the relatively clear supernate was further diluted with an equal volume of formalinized saline and recentrifuged for the same period of time. In most cases this procedure gave a clear solution which was considered a 1:4 dilution of feces. In certain instances the extract did not clear completely, but this did not appear to affect materially the subsequent results. It seems to us, however, that should the determination of coproantibodies come into general use, better and more rapid methods of clarification of the stool extract must be developed perhaps by the use of settling agents. The fecal extracts were used as a source of agglutinin in the usual tube agglutination test technic. The agglutination tubes were incubated at a temperature of 45°C overnight and read with the aid of the concave surface of a microscope mirror as is done commonly in the reading of Kahn tests.

The data obtained are presented in Table I. With one exception (No. 16), all subjects developed significant blood serum agglutinin titers against all 3 organisms. In most cases the maximum titer was reached on the fourteenth day following the initial injection of vaccine. No agglutinins were detected in fecal extracts of 7 subjects at any time during the course of the experiment despite the presence of significant serum titers. Of the remaining subjects fecal agglutinins against only one organism in the vaccine mixture were found in 5 individuals, against 2 organisms in 3 subjects and against all 3 organisms in 5 subjects. Seven volunteers showed fecal agglutinins against *S. typhi*, 14 against *S. paratyphi A*, and 5 against *S. paratyphi B* at some time during the course of the experiment. The appearance of fecal agglutinins against the homologous organisms in a particular individual was extremely irregular, in 18 instances being detected only once, in 6 instances twice, and in 2 cases 3 times. No correlation is apparent between the presence of fecal antibody and the antibody titer of the blood serum; nor is there any obvious relationship between fecal antibody appearance and the time and number of antigen injections.

Summary. These results fail to indicate any rise in fecal agglutinin titer prior to the appearance of blood serum agglutinins. In this respect and also in regard to the irregularity of antibody appearance in the feces of human subjects following T. A. B. vaccination our results differ from the regular and rapid appearance of coproantibody reported to follow cholera vaccination.

[8] Harrison, P., personal communication.