TABLE I.

Rat	Wt. gm.	Irradiation 20 min. 1 meter	Rachitogenic Diet	Tetanus Toxin mg. per 100 gm. Rat.	Remarks.
I-341	54-90	50 days	50 days	.005	Slight local tetanus. Recovery.
I-342	60-98	" "	" "	.01	Severe local tetanus. Recovery.
I-343	58-82	" "	" "	.005	Slight local tetanus. Recovery
I-344	60-70	" "	" "	.01	Severe local tetanus. Recovery.
I-345	26-44	" "	" "	.02	Died—5 days after injection.
II-346	44-	0			Died. Severe rickets.
II-347	48-80	0	" "	.0005	Normal.
II-348	48-78	0	" "	.001	Died—4 days after injection.
II-349	28-56	0	" "	.01	Died—3 days after injection.
II-350	26-60	0	" "	.005	Died—3 days after injection.
III-361	56-80	50 days	" "	.02	Died—5 days after injection.
III-362	62-94	" "	" "	.01	Local tetanus. Recovery.
III-363	54-86	" "	" "	.005	Local tetanus. Recovery.
III-364	50-74	" "	" "	.001	Slight local tetanus. Recovery.
III-365	60-96	" "	" "	.0005	Normal.
IV-371	54-82	" "	" "	.02	Died—3 days after injection.
IV-372	48-69	" "	" "	.01	Local tetanus. Died 11 days after injection.
IV-373	52-84	" "	" "	.008	Local tetanus. Recovery.
IV-374	62-88	" "	" "	.001	Very slight local tetanus. Recovery.
IV-375	56-86	" "	" "	.0008	Normal.
V-366	64-94	0	" "	.02	Died—3 days after injection.
V-367	62-89	0	" "	.01	Died—4 days after injection.
V-368	50-77	0	" "	.005	Died—3 days after injection.
V-369	70-98	0	" "	.001	Severe local tetanus. Destroyed on 25th day.
V-370	68-96	0	" "	.0008	Severe local tetanus. Destroyed on 25th day.

4499

Radiological Study of Motility of Gastro-Intestinal Tract of Rachitic Rats.

L. J. MENVILLE, S. N. BLACKBERG AND J. N. ANÉ.
(Introduced by J. H. Musser.)

From the Department of Medicine and Department of Pharmacology, Tulane University.

Although rickets is a disease primarily affecting the skeletal parts it nevertheless produces abnormal changes in the entire body. It is usually associated with muscular weakness and relaxation and since one of the early symptoms of rickets is constipation, the following experiments were planned to compare radiologically the motility of

the gastro-intestinal tract of rachitic rats with that of normals.

In these experiments 40 rats were used, 20 rachitic and 20 normal. Many of this number had to be discarded during the work for various reasons. The animals were from a uniform strain of Albino rats raised by one of us (S.N.B.) from Wistar Institute Stock. The litters were equally divided among the normal and rachitic groups. The normal groups received adequate diet. The rachitic groups were fed a rachitogenic diet, (McCollum 3143) until definite rachitic bone changes were visible by means of the x-rays. These animals were kept in individual cages in the x-ray laboratory for 3 days prior to receiving the bariumized meal, in order to let them become accustomed to the noises of the x-ray apparatus so that their motility would not be disturbed. It was shown that psychic influences such as fear and anger markedly retarded the motility of the gastro-intestinal tract. This was clearly demonstrated by the prolonged emptying time of the rats which were tied to wooden racks so as to make roentgenograms. After the rats were fasted for 48 hours and water withheld 24 hours they were given a barium meal composed of 10 gm. of barium sulphate and 10 cc. of buttermilk and were allowed to eat for 20 minutes, when they were fluoroscoped immediately in loose cotton sacks to ascertain whether their stomachs were full.

TABLE I.

Average	Normals	Rachitic
Weight of rats	210 gm.	115 gm.
Weight of food	5.8 gm.	10.5 gm.
Stomach emptying time	6 hrs. 14 min.	8 hrs. 5 min.
Appearance in cecum	3 hrs. 37 min.	2 hrs. 28 min.
Small intestine emptying time	10 hrs. 26 min.	12 hrs. 2 min.
From stomach emp. time to small intestines emp. time	4 hrs. 12 min.	4 hrs.
Colon emptying time	65 hrs.	88 hrs.

As shown in Table I the average emptying time of the stomachs of the rachitic group was somewhat longer than the average of the normal group. The stomachs of the normal rats were all of the fish-hook type and hypotonic in tone, while the rachitic rats' stomachs were also of the fish-hook type but inclined to the atonic tone. By observing the early appearance of the food column in the cecum of every rachitic rat, we believe that this demonstrates an apparent hypermotility of the small intestine in this group. The colons of the rachitic group, on the other hand showed a hypomotility as evidenced by the slow emptying of their colon as compared to the nor-

mal group. It was also observed that the colon of the rachitic group was of the atonic type, often markedly distended and lowly situated.

4500

Further Observations on Experimentally Produced Arteriovenous Aneurysm.*

I. M. GAGE AND GEORGE HERRMANN.

From the Department of Surgery and the Department of Medicine, Tulane University School of Medicine.

Arteriovenous aneurysm studies which we have been pursuing have yielded findings, difficult of immediate interpretation. We found[1] the cardiac shadow uniformly enlarged on immediate postoperative fluoroscopic examination and confirmed this with roentgenograms. These dogs had been completely anesthetized with large doses of sodium barbital, and apparently as a result the postoperative pulse rates were slower. Later we found the heart size actually decreased immediately after opening of an A-V fistula. These latter dogs had been anesthetized with ether, and their heart rates were high. Ten dogs submitted to general anesthesia for abdominal operations for the production of intestinal adhesions, with gauze and iodine, were studied before and after the induction of anesthesia and operation. There was usually a decrease in the cardiac size, especially in the region of the right ventricle. The decrease was related to the height of the rise in the heart rate. In a few of these dogs in which the heart rate remained low there was little or no decrease in heart size.

In order to study the mechanism of the thrill and the effects of the lesions, 3 types of arteriovenous aneurysms have been produced. The original type I, commonly made and observed clinically, is the side to side anastomosis with a fistula between artery and vein. The second type II consisted in suturing of the proximal end of the artery into the side of the vein, thus adding the total arterial output of the specific artery to the venous return volume of the specific vein. The third type III was produced by suturing the proximal end

* Aided by a grant from the David Trautman Schwartz Research Fund of The Tulane University.

[1] Gage, I. M., and Herrmann, George, PROC. SOC. EXP. BIOL. AND MED., 1928, XXV, 765, 767.