Luckens, M. M., J. Van Eps, and W. H. Davis: Exp. Med. Surg. *29*, 25–28, 1971

Transit Time of Food Through The Digestive Tract Of The Bat, *Eptesicus Fuscus*[1]

By
MARK M. LUCKENS[2], JANE VAN EPS[2],
and WAYNE H. DAVIS[3]

Our work on the effect of Hibernation on the metabolism in bats made it necessary to learn the fate of food eaten by bats just prior to being placed in a refrigerator. We decided to investigate the possibility that digestive activity might cease at low temperatures.

Fifty-two big brown bats, *Eptesicus fuscus,* were captured in buildings in Kentucky during September. They were brought into the laboratory and maintained for two weeks on a regimen described previously (1).

Intestinal transit time was studied using food which had been thoroughly mixed with 10%, by weight, of barium sulfate (Micropaquette-picker X-ray Corporation, White Plains, New York). Two bats were each fed one gram of this mixture and roentgenograms were taken at 15 minute intervals throughout the first hour. Twenty-one other bats were fed the same mixture and observed continuously in the laboratory until the first marked fecal pellets were produced.

The effect of low temperature on intestinal motility of bats was determined by feeding the rest of the animals a similar diet and placing them in closed boxes in a refrigerator at 4°C. The test animals were removed at predetermined intervals, sacrificed using chloroform, and roentgenograms were made. The stomachs were then opened and the contents examined and weighed.

Results. The roentgenograms showed that, at room temperature, some of the food had moved well into the small intestine by 15 minutes after feeding. By 45 minutes, some labeled material had appeared in the large bowel (Fig. 1). The earliest time after feeding that marked material was defecated was 90 minutes and nearly all (18 of 22) bats produced marked pellets within 130 minutes. The average time lapse was 122 minutes and the standard deviation, ±16. In several bats, 2–4 mm of the 10–15 mm pellet apparently remained from the previous feeding.

[1] This work was supported, in part, by Grant No. C C-00254 from the National Communicable Disease Center, and N.I.H. Grant No. GM 11149-03.

[2] Institute of Environmental Toxicology and Occupational Hygiene, College of Pharmacy, University of Kentucky, Lexington, Kentucky 40506

[3] Department of Zoology, University of Kentucky, Lexington, Kentucky 40506

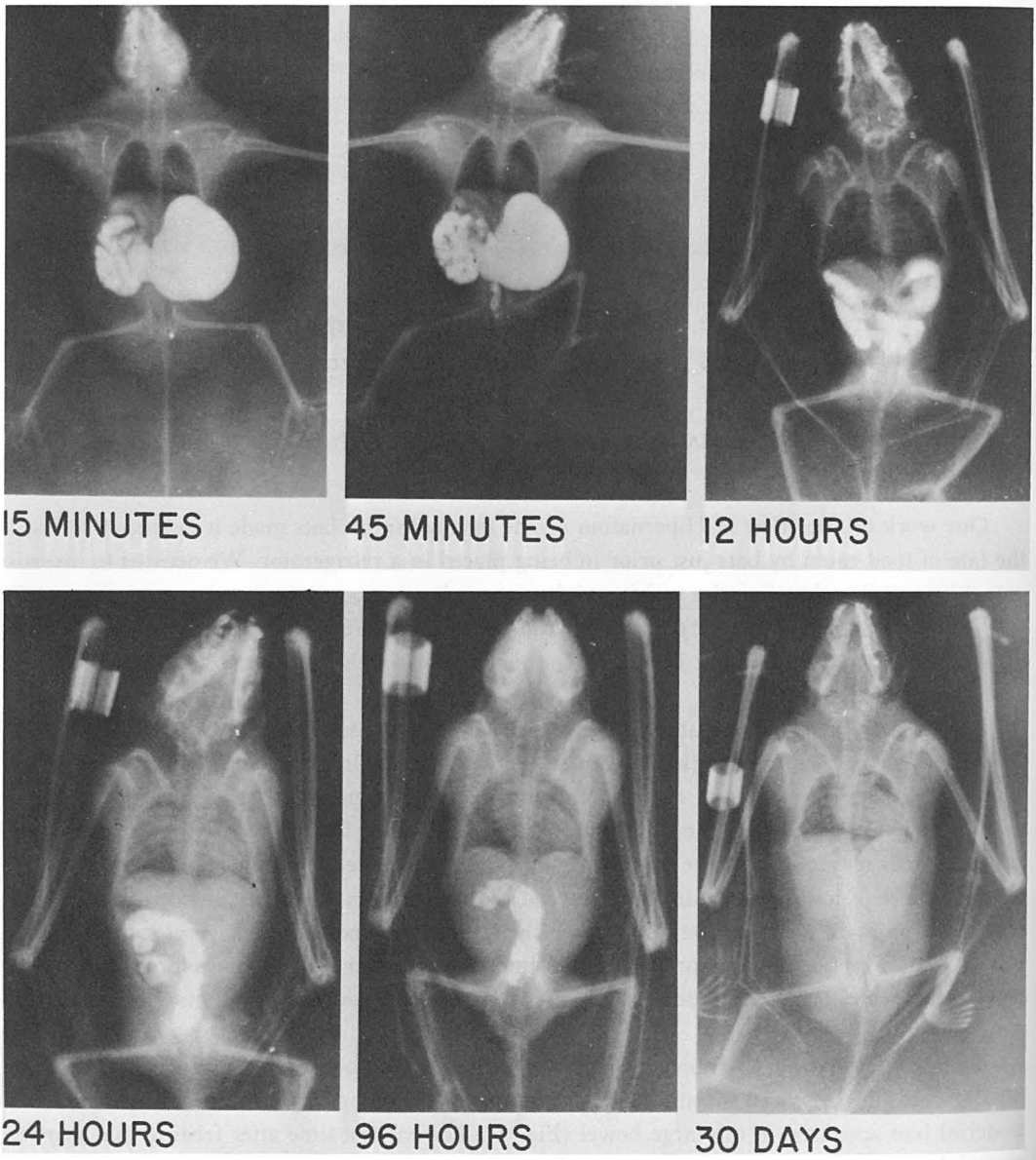

Fig. 1. Fifteen and 45 minute illustrations are of bats maintained at room temperature. Remainder are of refrigerated animals.

Since all bats had been fed 3–4 grams of food 24 hours previously, transit of food through the tract was essentially complete within this time at room temperature.

A noticeable relationship between the amount of food ingested and retention time in the stomach exists in bats kept at 4°C. Bats which have eaten more retain a greater percentage of the food in the stomach for a longer time than bats which have eaten smaller amounts. A large

portion of the food had moved out of the stomach even in the bats which had been refrigerated for only a few hours. Probably most of this activity took place before the bats dropped into torpor. Stomachs were nearly empty in all bats kept in the refrigerator at least 16 days.

Roentgenograms of refrigerated bats showed the persistence of marked material in the digestive tract after it had passed the stomach. One bat maintained in the refrigerator for 96 hours had an empty stomach but its colon was laden with marked material (Fig. 1). Bats kept 16 days in the refrigerator showed no marked material in the stomach, but retained some in the large intestine. Only in the 30 day bats was the labeled material gone: one of these showed a trace.

The shortest time for complete transit of food through the digestive tract of *E. fuscus* at room temperature was 90 minutes, which was considerably longer than had been previously reported for other insectivorous bats. Cranbrook (2) found that, in British vespertilionids, material passed through the digestive tract in 28 minutes. Klite (3) reported that dyes intro-

Table 1

Transit of food marked with barium sulfate through the digestive tract of bats (E. fuscus) *maintained at 4° C*

Sex	Wgt. (g)	Amount Fed (g)	Time in refrigerator	GI tract contents (g)	% of food remaining
♀	12.68	0.56	2 hr	0.05	9
♀	12.13	1.53	2 hr	0.47	31
♀	14.72	3.50	4 hr	1.58	42
♀	16.84	0.86	4 hr	0.23	27
♀	16.20	1.84	4 hr	1.28	70
♂	13.81	1.53	4 hr	1.01	66
♂	10.78	0.98	12 hr	0.21	21
♀	17.73	0.94	12 hr	0.12	13
♂	14.39	1.78	12 hr	1.15	65
♀	16.21	1.11	12 hr	0.88	79
♀	19.80	1.90	24 hr	0.32	19
♀	17.93	3.07	24 hr	2.18	71
♀	19.57	0.77	24 hr	0.53	69
♂	15.52	0.68	24 hr	0.20	29
♂	18.94	1.18	96 hr	0.11	9
♂	13.68	0.55	96 hr	0.00	0
♂	16.37	1.00	96 hr	0.25	25
♀	15.98	0.92	96 hr	0.46	50
♀	20.21	2.50	8 days	0.10	4
♂	17.80	2.85	8 days	0.80	28
♀	19.80	1.58	8 days	0.09	6
♀	14.29	1.84	15 days	0.10	5
♀	19.30	2.76	15 days	0.00	0
♀	20.67	1.91	16 days	0.13	7
♂	19.05	2.60	16 days	0.07	3
♀	23.28	1.68	30 days	0.12	7
♀	18.86	1.45	30 days	0.10	7
♀	20.39	2.75	30 days	0.05	2
♀	22.86	0.74	30 days	0.03	4

duced into the stomachs of *Molossus major, Chilonycteris rubiginosa,* and *Carollia perspicillata* traversed the intestine within 15 minutes.

In experiments involving feeding materials to *E. fuscus,* the investigator should allow 24 hours for passage through the digestive tract when working at room temperature, and 30 days when working with bats in hibernation.

References

1. *Davis, W. H., and M. M. Luckens*: Lab. An. Care *16*: 224 (1966).
2. *Cranbrook, Earl of*: Proc. Zool. Soc., London *145*: 143 (1965).
3. *Klite, P. D.*: J. Bacteriol. *90*: 375 (1965).