Bats: Sensitivity to DDT

Abstract. *Big brown bats,* Eptesicus fuscus, *were fed single doses of varying amounts of DDT in corn oil injected into meal worms. All the doses of DDT fed to the bats, 40 milligrams or more per kilogram of body weight, were lethal. Within a few hours to 13 days after being dosed, the animals developed convulsions; some bats survived up to 3 days after the onset of the symptoms of poisoning. Bats appear to be far more sensitive to DDT than any other mammal yet tested.*

Concern about recent decreases in bat populations in the United States (*1*) has caused us to begin investigating the possible effects of pesticides on bats. Because of its widespread agricultural, public health, and domestic applications, DDT was chosen as the initial pesticide for study.

Table 1. The effects of DDT on the bat *Eptesicus fuscus.*

Sex	Wt. (g)	Dosage (mg/kg)	Time after being dosed (hours)	
			Until tremors	Until death
M	17.9	800	<2½	2½–18
F	22.5	400	6–7	18–28
F	25.0	335	7	50–66
F	21.0	200	3½	8–19
F	19.5	200	3–19	23–35
F	17.5	150	<3	6–22
F	19.5	100	3–6	6–22
F	19.3	100	5	11–23
M	16.2	100	10–24	31–59
M	14.6	100	48–55	118–130
M	14.7	100	49	108–120
M	14.0	80	<10	10–24
F	23.0	80	10–24	31–47
F	25.0	80	10–24	50–73
F	18.0	75	10–23	51–61
M	14.9	60	9–23	31–46
F	25.4	60	47–73	120–123
F	26.7	60	73–76	126–143
F	19.0	50	11–23	34–50
F	20.5	50	124–143	193–216
M	14.3	40	<9	30–46
M	14.0	40	30	46–72
F	24.3	40	30–46	97–107
F	20.5	25	173	245–262
F	19.0	25	*	Survived†
F	21.0	25	20–44	Survived†
F	18.9	20	192–216	Survived†
F	23.5	20	322–346	Survived†
F	24.9	20	192–216	240–264
F	19.5	0	*	600–624
M	14.3	0	*	Survived†
F	25.3	0	*	Survived†
F	15.2	0	*	Survived†
F	16.8	0	*	Survived†
F	14.4	0	*	Survived†
F	15.9	0	*	Survived†
F	17.7	0	*	Survived†

* Tremors never observed. † Bat released in apparent good health at end of experiment.

Bats (*Eptesicus fuscus*) were captured during May 1964 in attics of several houses in Georgetown and Lexington, Kentucky. They were brought into the laboratory, weighed, banded, and put into individual cages consisting of wide-mouthed gallon jars containing a bedding of wood shavings covered with filter paper. A small dish of water was placed in each cage. Solutions of technical-grade DDT in corn oil were prepared in such concentrations that the calculated dose would occupy a volume of at least 0.50 ml. The calculated dose was taken up in a 1-ml tuberculin syringe. By means of a 26-gauge needle, the DDT solution was injected in approximately equal portions into five to eight meal worms (*Tenebrio molitor*). Each worm was fed to the test animal immediately after injection, care being taken to ensure that the entire larva was consumed. The injected worms were readily eaten. The bats actually seemed to prefer the worms injected with corn oil to normal meal worms. Bats used as controls were fed worms injected with corn oil only. The bats were afterward fed on five to ten adult *Tenebrio* daily, as long as they were able to eat. Observations were made at intervals of 24 hours or less. The experiment was terminated after 28 days.

The results of the experiment are shown in Table 1. Although some bats receiving the highest doses showed tremors as early as 2½ hours after dosing, most showed initial tremors on the second morning after feeding. Two bats given low (though lethal) doses of DDT showed initial tremors as late as 5 and 7 days after being dosed.

Behavior patterns were similar in all cases of poisoning. Occasional tremors were followed by continual and progressively worsening convulsions. Near death, behavior was reduced to an occasional tremor. Controls were nearly always quiescent.

Our bats seemed far more sensitive to DDT than other mammals. For example, the oral LD_{50} (lethal dose, 50 percent effective) for mice has been reported to be 400 mg/kg (*2*); for rats, 150 mg/kg; and for rabbits, 300 mg/kg (*3*).

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References and Notes

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Sex-Linked Albinism in the Japanese Quail

Abstract. *From a single white* Coturnix *chick hatched in August 1963, a white colony has been developed. The results of breeding experiments are consistent with the view that the albinism is sex-linked and recessive. It appears likely that the mutation occurred in the first white female hatched, or her sire.*

Although Japanese quail (*Coturnix coturnix japonica*) are being used increasingly in physiology and genetics research, few genetic variants of any kind have been reported for this species.

A single white, pink-eyed quail chick appeared in August 1963 in a hatch of several thousand normally pigmented quail. The parentage was unknown, but the stock has been maintained at this laboratory for several years, and many thousands of normal chicks have been hatched. The down was blond, similar to that of a Leghorn chick. There was a suggestion of the normal pattern of longitudinal stripes on the back, but closer examination revealed no darker feathers in these areas. The eyes were bright pink, and the bird appeared to be slightly more photophobic than its normal hatchmates.

When the bird was about 1 month old and the adult plumage was well established, it was evident that it was a female. Light buff-colored spots again suggested the pattern of the normally pigmented bird, but feathers from such areas, on microscopic examination, contained no melanin or other pigment granules (Fig. 1).

The white bird began to lay at 7½ weeks of age. Both eggshell and yolk were pigmented normally (the yolk was deep yellow-orange, the shell was light tan mottled with brown and black spots). After an early aggressive period, during which the bird was laying but would not mate, egg production stopped, and she underwent a partial molt. When laying again commenced, a normally pigmented male from the general popu-