

## HYPERTENSIVE EFFECT OF *LATRODECTUS* VENOMS

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THE venoms of several subspecies of the black widow spider, *Latrodectus mactans*, have a hypertensive effect on the mammalian systemic arterial pressure. Troise (1928), Sampayo (1944), Cicardo (1954) and Calvo et al. (1957) demonstrated this with the venom of *L. mactans mactans*, Shapiro et al. (1939) with the venom of *L. mactans indistinctus*, and Bettini and Toschi-Frontali (1960) with the venom of *L. mactans tredecimguttatus*.

This paper presents the results of a study that was undertaken to determine whether the venoms of three other species of *Latrodectus*, *L. variolus*, *L. bishopi*, and *L. geometricus*, have a similar hypertensive effect. This study is part of a more extensive investigation of the comparative toxicology and biochemistry of the venoms of the North American *Latrodectus*.

### MATERIALS AND METHODS

Lyophilized venom gland extract reconstituted with physiological saline was used in all experiments. The method of preparation of this extract is given in a previous paper (McCrone, 1964). The glands were taken from mature female *L. mactans mactans*, *L. variolus*, *L. bishopi*, and *L. geometricus* collected in the state of Florida.

The 2.1-3.8 kg rabbits used in this study were anesthetized with intravenous Nembutal (Abbot). The dose for each rabbit was determined individually by observing the eyelid reflex, the average being about 5-6 cc of a 12.5 mg/cc solution. The rabbits were then heparinized with intravenous Panheparin (Abbot). The femoral artery was exposed and cannulated with a small polyethylene tube which was connected to a recording mercury manometer by means of a hypodermic extension tube. Locke's solution containing a small amount of the anticoagulant dye chlorazol fast pink was used in the connecting tube. After normal mean arterial pressure was established and maintained, various dosages of venom were injected into the ear veins of the rabbits and the changes in the mean arterial pressure were recorded on smoked kymograph paper.

TABLE 1  
Effect of four *Latrodectus* venoms on mean systemic arterial pressure of rabbits

Rabbit	Venom	Dose (mg/kg)	Mean Pressure before Injection (mm Hg)	Latent Period (min.)	Max. Mean Pressure after Injection (mm Hg)	Net Increase in Mean Pressure (mm Hg)	Time (min.) to reach Max. Mean Pressure
1	mactans	0.033	87	0:30	137	50	1:10
2	mactans	0.080	111	1:00	122	11	1:30
3	mactans	0.158	106	0:50	147	41	4:50
4	variolus	0.067	79	1:50	106	27	6:20
5	variolus	0.190	116	1:00	167	51	3:30
6	variolus	0.214	112	1:20	127	15	41:50
7	bishopi	0.067	115	0:50	119	4	2:00
8	bishopi	0.178	67	0:27	89	22	4:10
9	bishopi	0.232	103	0:58	160	57	11:20
10	geometricus	0.035	90	2:20	103	13	5:20
11	geometricus	0.083	89	0:55	119	30	15:25
12	geometricus	0.261	96	1:55	130	34	6:25

## RESULTS

A total of 12 experiments were performed, 3 with each venom. An increase in the mean systemic arterial pressure was observed in all cases; the increases ranged from 4-57 mm Hg beginning after a latent period of 27-140 seconds, and with one exception reaching a maximum after 1-16 minutes. A summary of the results of these experiments is given in Table 1.

An unusual effect was recorded in rabbit number 6 which received 0.6 mg of *L. variolus* venom. In all other animals the maximum pressure was reached in less than 16 minutes, but in this animal there was an initial small increase of 8 mm Hg after a latent period of 80 seconds, followed by a return to normal after 2 minutes, with subsequent gradual increase in pressure until a maximum increase of 15 mm Hg was recorded after 41:50 minutes.

## DISCUSSION

Our studies demonstrate that all of the known North American species of the genus *Latrodectus* have venoms which have a hypertensive effect on the mammalian systemic arterial pressure. McCrone (1964) has previously shown that these venoms are lethal to mammals. Troise (1928) and Sampayo (1944) on the basis of their experiments concluded that the hypertensive factor in the venom is separate from the lethal neurotoxic factor. Bettini and Toschi-Frontali (1960), however, found the same protein fraction is responsible for both effects based on fractionation studies using paper electrophoresis.

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