

SHORT COMMUNICATION

**MYOCARDIAL DEPRESSANT FRACTION IN THE VENOM OF
*DENDROASPIS ANGSTICEPS***

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Summary: Whole venom *Dendroaspis angusticeps* produced a negative chronotropic and inotropic effect on the heart. Isolation of the fraction (T₃₉) produced the same effect. Negative inotropic effect was blocked by atropine. The bradycardia may be due to a cholinergic effect and the negative inotropic to a direct depressant effect on the myocardium.

Key words: *Dendroaspis angusticeps* cardio-depressant

INTRODUCTION

It has been reported that some fractions of *Naja mossambica*, *N. nivea* N., *melanoleuca* and *N. naja* have a cardio-depressant effect on the rat heart (1,3). In the course of our experiments, it was found that the venom of *Dendroaspis angusticeps* reduced the rate and force of contraction of the rabbit heart. This paper deals with the mechanism of this cardio-depressant effect on the heart and the identification of the myocardial depressant factor.

MATERIALS AND METHODS

The isolated rabbit heart was set up according to the method of Langendorff. The contractions were recorded on a Microdynamometer (Ugo Basile 7050) coupled to an isometric transducer (Ugo Basile DY₁). The venom was fractionated by column chromatography on a CM-Sephadex C25 and fractions eluted by sodium phosphate buffer (unpublished communications). The protein content of the fractions as determined by the method of Lowry *et al.* (2).

Drug used :- Atropine sulphate (Sigma, London), hexamethonium bromide (Sigma, London). Dessicated whole venom was obtained from Mr. J.H. Leakey, Baringo Snake Farm, P.O. Box 1141, Nakuru, Kenya.

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RESULTS

The isolated rabbit heart was considerably slowed after administration of small doses of the venom (10, 20, 50 and 100 μg in 0.1 ml); the force of contraction was also diminished. After perfusion of the heart with Ringer solution containing atropine (100 $\mu\text{g}/\text{ml}$) for 20 min, no reduction in the heart rate was noted, although there was a slight reduction in the force of contraction (Fig. 1). Column chromatography of the venom

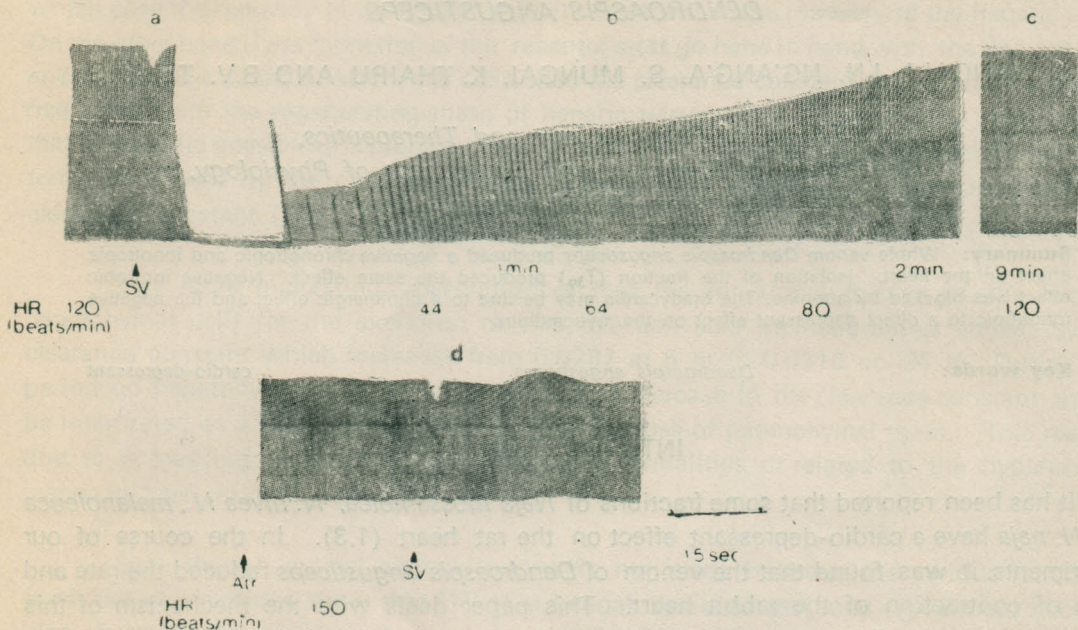


Fig. 1 : Effect of administration of whole snake venom (SV) on the force of contraction and heart rate (HR) of the isolated rabbit heart.

- Normal contractions of the isolated heart.
- Effects on the force of contraction and heart rate 1 min after the administration of snake venom (100 $\mu\text{g}/0.1 \text{ ml}$).
- Recovery of heart rate and force of contraction 9 min after the administration of the venom.
- No effect on the heart rate with the same dose of the venom after perfusion of the heart with atropinized (Atr) Ringer solution (100 $\mu\text{g}/\text{ml}$). Slight decrease in the force of contraction was noted.

led to isolation of a cardiac depressant factor, which was designated as T_{39} fraction. Administration of T_{39} fraction (200 μg in 0.1 ml) to the isolated rabbit heart slowed the heart rate and reduced the force of contraction. Recovery of heart rate and force of contraction occurred in about 3 min (Fig. 2A). After perfusion of the isolated rabbit heart with solution containing atropine (100 $\mu\text{g}/\text{ml}$; Fig. 2B) or hexamethonium (100 $\mu\text{g}/\text{ml}$; Fig. 2C) for 20 min, no effect on the heart rate was noted but there was a reduction in the force of contraction with the same dose of T_{39} fraction.

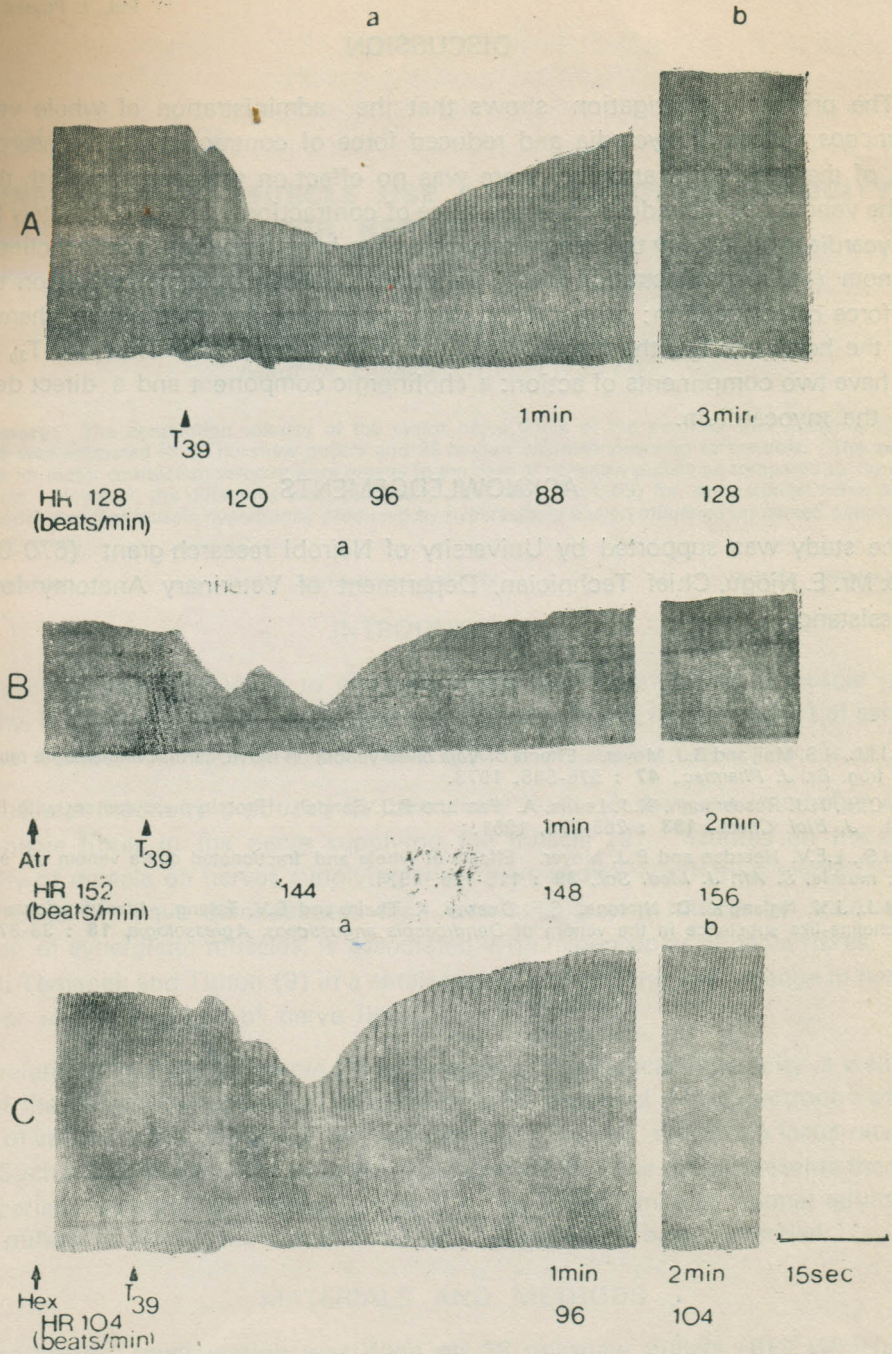


Fig. 2 : Effect of administration of T₃₉ fraction obtained by column chromatography on the force of contraction and heart rate(HR) of the isolated rabbit heart.

(A) Changes in the force of contraction and heart rate (a) 1 min after administration of T₃₉ fraction (200 μ g/0.1 ml). Recovery (b) after 3 min.

(B and C) No effect on the heart rate with the same dose of T₃₉ fraction after perfusion with atropinized (Atr) Ringer solution (100 μ g/ml) or hexamethonium (Hex; 100 μ g/ml). Note the decrease in the force of contraction.

DISCUSSION

The present investigation shows that the administration of whole venom of *D. angusticeps* causes bradycardia and reduced force of contraction of the heart. After perfusion of the heart with atropine, there was no effect on the heart rate with the same dose of the venom but the reduction in the force of contraction was not completely blocked. The bradycardia produced by the venom may be due to large amount of acetylcholine present in the venom (4). Administration of T₃₉ fraction produced the same effect on the heart rate and force of contraction; on perfusion with atropine or hexamethonium, there was no effect on the heart rate but the force of contraction was reduced. Thus the T₃₉ fraction seems to have two components of action; a cholinergic component and a direct depressant effect on the myocardium.

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