of each species. Although it is possible that some of the catecholamine extracted came from the tissue of the venom reservoir the extraction procedure was designed to minimize such extraction (reservoirs were opened by puncturing, rather than homogenization of whole reservoirs). It should also be noted that the catecholamine concentrations demonstrated represent a level of 1 mg/g in the honey bee and 100 µg/g in the wasp. These figures are even more significant when compared with the levels of catecholamines extractable from homogenized insect tissues which are of the order of 5–10 µg/g[9].

The failure of other investigators to note the presence of such significant amounts of catecholamines in these venoms probably lies in the utilization of dried, rather than fresh, venom extracts for chemical analysis and examination. This introduces the possibility of the decomposition of catecholamines to pharmacologically inactive derivatives. A commercial sample of crystalline bee venom (Calbiochem) was extracted and chromatographed with negative results.

In most hymenopterans the venom is used as a defense against other arthropods. It is therefore relevant to consider the physiological effect of 100 ng of dopamine injected into another insect. Dopamine has been reported to produce hyperactivity of the insect central nervous system[10] and to accelerate the heart beat rate[11]. I have found that the application of dopamine, to an isolated heart preparation of *Periplaneta americana*[12], in a concentration equivalent to the dilution of 100 ng in the haemolymph, produces a 2- to 3-fold increase in the rate of heart beat. Injection of 100 ng of dopamine in 1 ml of insect saline into intact cockroaches produced no hyperactivity, or other gross effect, but the heart beat rate (observed through the tergae) was markedly increased.

As an initial hypothesis it is therefore suggested that at least part of the significance of the dopamine content of vespid venoms lies in its ability to accelerate the circulation of the haemolymph, thus speeding the distribution of other chemical fractions of the venom to their sites of action[13].

Zusammenfassung. Die Anwesenheit von Dopamin und Noradrenalin im Bienen- und Wespengift wurde durch Fluoreszenzmikroskopie, Dünnschichtchromatographie und Spectrophotofluorimetrie nachgewiesen. Der Dopamin-Gehalt eines Stiches genügt, um die Herztätigkeit eines Insekts zu beschleunigen, was auch die Verteilung der giftigen Bestandteile zu den Wirkungsstellen beeinflussen kann.

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Amounts of catecholamines present in single honey bee and yellow jacket venom reservoirs

	Dopamine (ng)	Noradrenaline (ng)
Apis mellifera	775 ± 230	115 ± 20
Vespula arenaria	125 ± 10	4.0 ± 0.5

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The Effect of Selective Cardiac Adrenergic β-Blockade on the Hypotensive Effect of Hydrallazine

Hydrallazine lowers the blood pressure most probably by a direct peripheral vasodilator action[1]. The fall in pressure causes a baroreceptor mediated sympathetic stimulation[2,3], which leads to an increase in cardiac output[4]. The increase in cardiac output must reduce the hypotensive effect. It might be expected that blockade of this reflex sympathetic stimulation would enhance the hypotensive effect of hydrallazine. However, a recent study showed that a combination of hydrallazine and propranolol was less effective in lowering blood pressure of the normal dog than hydrallazine alone. This led to the conclusion that peripheral β-adrenergic blockade antagonized the decrease in peripheral resistance caused by hydrallazine[4]. Thus, the hypothesis that a selective cardiac adrenergic β-receptor blockade might enhance the hypotensive effect of hydrallazine has been investigated. Practolol (Eraldin, ICI) was used to produce selective cardiac adrenergic β-receptor blockade[5].

Materials and methods. 9 mongrel dogs weighing 16 to 33 kg, were anaesthetized with thiopentone sodium (Pentothal, Abbott) 30 mg/kg i.v. supplemented with pentobarbitone sodium (Nembutal, Abbott) 2–4 mg/kg i.v. as needed during the experiment. A cuffed endotracheal tube was inserted and artificial ventilation with room air was maintained by a respirator (C. F. Palmer). Two polyethylene cannulas (O.D. 1 mm) filled with heparinized saline were inserted into the cephalic vein and advanced into the subclavian vein; one of these was used for anaesthetic administration and the second for hydrallazine and practolol administration. A third polyethylene cannula (O.D. 3 mm) inserted into the femoral artery and advanced into the abdominal aorta, and was connected to a transducer (Bell and Howell) and the blood pressure recorded on a 4-channel recorder (Devices). A constant electrocardiogram was obtained and the heart rate recorded by a ratemeter triggered by the

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Responses of systolic blood pressure (SBP), diastolic blood pressure (DBP) and heart rate (HR) after hydrallazine, before and after practolol

Hydrallazine dose		Responses before practolol	Responses after practolol	P value
0.1 mg/kg	SBP	-5.8 ± 3.7	-2.4 ± 1.8	>0.5
	DBP	-4.3 ± 0.9	-4.6 ± 2.9	>0.5
	HR	$+15.9 \pm 4.0$	$+1.3 \pm 0.5$	$0.005>p>0.001$
0.3 mg/kg	SBP	-5.2 ± 1.7	-1.2 ± 1.3	$0.2>p>0.1$
	DBP	-8.6 ± 2.2	-3.0 ± 3.5	$0.025>P>0.01$
	HR	$+14.4 \pm 3.4$	$+0.3 \pm 0.3$	$0.025>p>0.01$
0.6 mg/kg	SBP	-10.7 ± 2.5	-5.8 ± 1.9	$0.2>p>0.1$
	DBP	-10.8 ± 1.8	-5.2 ± 1.6	$0.025>p>0.01$
	HR	$+2.8 \pm 1.4$	$+1.8 \pm 0.5$	>0.5
1.0 mg/kg	SBP	-27.0 ± 9.8	-24.3 ± 8.9	$0.2>p>0.1$
	DBP	-33.0 ± 8.6	-21.6 ± 8.9	$0.1>p>0.05$
	HR	$+7.8 \pm 2.7$	$+1.9 \pm 0.6$	$0.2>p>0.1$

Values present means $\pm$ S.E.M. in 9 experiments.

electrocardiogram R-waves. Hydrallazine hydrochloride (Apresoline hydrochloride, Ciba) was given i.v. in the following order: 0.1, 0.3, 0.6 and 1.0 mg/kg. Each dosage was flushed in by injecting 3 ml of heparinized normal saline. The peak hypotensive effect was observed within 10–20 min. The blood pressure was allowed to return to its baseline value, which took an additional 5–10 min before the following injection was made. The heart rate increase lasted longer than 30 min, and it was usually higher than its baseline value when the following injection was made. Priority was given to the hypotensive effect because it was the primary purpose of the study. Practolol (Eraldin, ICI) 2 mg/kg i.v. was given over 5 min. 30 min after practolol administration, the hydrallazine dose-effect study was repeated.

The paired changes in systolic blood pressure, diastolic blood pressure and heart rate observed after hydrallazine administration before and after practolol administration were compared by t-test, and P values less than 0.05 are taken as significant[6].

Results. The Table shows that i.v. hydrallazine lowered systolic and diastolic blood pressure. Practolol lessened hydrallazine effects of lowering systolic and diastolic blood pressure which were significant for the changes in diastolic blood pressure observed after hydrallazine in doses of 0.3 and 0.6 mg/kg. The increase in heart rate was highest after the first hydrallazine injection and did not return to baseline for the second and subsequent injections. The absolute values for heart rates per min before and after hydrallazine injections, in order, were: 136.6 rising to 152.7; 152.7 rising to 167.1; 159.8 rising to 162.8 and 155.4 rising to 163.2. The comparable values were, after practolol, 138.7 rising to 140.0; 135.7 rising to 136.0; 134.9 rising to 136.7 and 134.6 rising to 136.5 following injections of hydrallazine. Practolol effectively blocked the increase in heart rate.

Discussion. These experiments have shown that after practolol administration hydrallazine caused minimal or no tachycardia. Despite this practolol did not enhance the acute hypotensive effect of hydrallazine in normotensive dogs. Rather, it lessened it. A similar observation was made by BRUNNER et al.[4] when propranolol was tested in combination with hydrallazine. The peripheral β-adrenergic blocking action of propranolol was suspected as a possible explanation. However, practolol, a selective cardiac β-adrenergic blocking agent did not enhance the hypotensive effect of hydrallazine. This would suggest that the increase in cardiac output after hydrallazine is not of importance in modifying the hypotensive effect of hydrallazine. Hence blockade of the increase in cardiac output does not bring about further lowering of blood pressure by hydrallazine. It is conceivable but unlikely that blockade of the cardiac component of the increased sympathetic stimulation has intensified its peripheral component manifested by peripheral vasoconstriction.

Zusammenfassung. Es wird gezeigt, dass Verabreichung von Hydrallazin einen Blutdruckabfall und eine reflektorische Tachykardie zur Folge hat. Nach Praktololgabe wird eine Hemmung der reflektorischen Tachykardie erreicht, während die blutdrucksenkende Wirkung erheblich vermindert wird.

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On the Anti-Inflammatory Properties of the Schistosomicide Niridazole (Ambilhar®)

In patients suffering from a guinea-worm infestation (*Dracunculus medinensis*) who were treated with niridazole it was noted that tenderness and swelling of the leg tended to disappear and that the worm could be easily extracted from its location[1–4].

From experiments carried out in monkeys (*Macacca mulatta, Cercopithecus aethiops*) artificially infected with *Dracunculus medinensis* no evidence could be obtained that niridazole impairs motility or viability of the worm[5].

Likewise, histological examination of clinical material obtained from patients treated with niridazole did not reveal any noticeable damage of the worm[6].

It was therefore felt that the niridazole treatment might affect the inflammatory reaction of the host and