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CHEMICAL AND PHARMACOLOGICAL PROPERTIES OF SCORPION AND SPIDER VENOMS

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The aim of the combined chemical and pharmacological approach in the study of venoms is to identify molecular entities responsible for specific pharmacological effects, to study their mechanism of action and hopefully to contribute for the understanding of the clinical manifestations and treatment of patients stung by these animals.

The description of the symptoms and signs of the envenomation produced in man and experimental animals done by the pioneers of the investigation on scorpion and spider venoms in South America: Vital Brazil,[7] H.R. Maurano[6], J. Vellard,[12] B. Houssay, M. Physalix,[8] O.Magalhães,[5], O.M. Campos,[7], P. Carvalho, A. Barrio [1], and others indicated that hardly the effects induced by these venoms could be explained by presence in the venom of only one active chemical entity. In the scorpion the targets of the venom action are the excitable tissues of the body and more precisely the ion channels. The protein and peptide fractionation methods introduced in the study of venoms by Karl Slotta[11], and J. Moura Gonçalves[3] allowed us to separate at least ten neuroactive substances in the *Tityus serrulatus* venom.[4] These neurotoxins are comparable to the toxins isolated from the venom of the African scorpion *Androctonus australis* and to the toxins of North American (Mexico) scorpion *Centruroides s. sufusus* in its lethality to fly larva, and mice either by s.c. or i.c.v. injection. The results are shown in Table I. The toxicity of *Tityus serrulatus* venom probably is higher for children .

In the venom of the armed spider *Phoneutria nigriventer,* using the observation of appearance of the different signs and symptoms induced in mice by i.p. injection of *P. nigriventer,* as classically described by Schenberg and Pereira Lima,[10], was possible to isolate four highly purified fractions of this venom. One of these fractions is a sodium channel ligand[9]. The fractionation of the venom of *Lycosa* and *Loxosceles* has not advanced, but proteases and neurotoxic substances were detected in the *Lycosa* venom.

TABLE I

Comparison between the activities of different scorpion venoms and toxins on fly larva and mouse

Sample	Fly larva: CPU[a] μ g/100mg	Mouse: LD 50 (s.c.) μ g/20g	(i.c.v.) ng/20g
AaH venom	0.300 (b)	8.40 (b)	n.d.
TS venom	0.260	17.50	n.d.
AaH IT	0.001 (b,c)	>1000.00	>50 x 103
I	n.t. (b,c)	0.34 (b)	10.0
II	n.t. (b,c)	0.18 (b)	0.5
III	n.t. (b,c)	0.45 (b)	7.0
Css II	>2.000	0.5	5
Css VI	>1.000	0.05	1.7
Ts I	>1.780	3.50	24.0
II	>1.780	3.70	6.0
III	>2.800	2.70	80.0
IV	>2.800	0.40	24.0
VI	0.091	8.50	2.5
VII	0.046	4.70	0.6
VIII	0.051	7.20	11.0

AaH: *Androctonus australis Hector;* Css: *Centruroides suffusus suffusus;* Ts: *Tityus serrulatus; n.d. not determined, nt: non-toxic; s.c.: subcutaneous; i.c.v.: intracerebroventricular; [a]CPU: contraction paralysis unit, (4); (b,c) according to Zlotkin et al.*

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