Nematicidal activity of quaternary alkaloids isolated after the bioguided fractionation of Colletia paradoxa

M. LAPROVITERA¹, M. DUARTE¹, X. URES², M. ANDINA², L. DOMÍNGUEZ², V. CESIO¹ & J. SALDAÑA²

¹Farmacognosia & Productos Naturales, ²Laboratorio de Experimentación Animal, ¹,²Facultad de Química, UdelaR, Montevideo, Uruguay

Key words: anthelmintic; veterinary phytopharmaceuticals.

Introduction: Nematodes are responsible for severe illness in ruminants that causes important economic losses (Waller, P.J. Acta Vet. Scand. 42, 33. 2001). Synthetic parasitic compounds are applied but their indiscriminate use had driven to worm resistance towards them (Taylor, M. Vet.Parasitol.10-9, 29, 2002). New, efficient, safe and low cost therapeutic alternatives are needed in order to keep cattle production viability. An alternative is the developing of anthelmintic phytotherapeutics. After a screening of different natural species, Colletia paradoxa (Espina de la Cruz) was selected for further investigations as it showed promising nematicidal activity.

Experimental: The activity was evaluated through a validated in vitro model of Nippostrongylus brasiliensis (L4), determining the Effective Concentration (EC₅₀). Each sample was serially diluted twice with 6 replicates. Statistical analysis were performed using Student’s test, p > 0.05 was not considered significant (Gordon, S. Il Fármaco, 71, 52, 1999). Albendazol was employed as positive control (EC₅₀ = 0.09µg/mL).

Results/Discussion: From the different C. paradoxa extracts assayed, the acidified water extract had an EC₅₀ = 24.5µg/mL whereas the infusion showed an EC₅₀ = 39µg/mL. The hydroalcoholic extract had an EC₅₀ = 415µg/mL. Methanol extraction of the infusion residue yielded a mixture of nematicidal quaternary isoquinoline alkaloids with an EC₅₀ = 66.5µg/mL. Open Column fractionation allowed the isolation of colletine and magnocurarine which were characterized using spectroscopic procedures (1D, 2D NMR and EI-MS). Acute oral toxicity in rats (OECD 425) was greater than 2000 mg/kg corresponding to category III.

Conclusion: C. paradoxa shows promising activity, suitable for the further development of an anthelmintic veterinary phytopharmaceutical and the quaternary alkaloids seem to be appropriate phytomarkers.