Autochthonous *Angiostrongylus cantonensis*, *Angiostrongylus vasorum* and *Aelurostrongylus abstrusus* infections in terrestrial gastropods from the Macaronesian Archipelago of Spain

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Background

Angiostrongylus cantonensis infections, causing eosinophilic meningitis in humans, were recently reported in rat final hosts and gastropod intermediate hosts in Tenerife. The nematodes *Angiostrongylus vasorum* and *Aelurostrongylus abstrusus* are of veterinary concern affecting canine and feline respiratory and cardiovascular system. These parasite infections belong to the group of gastropod-borne diseases. Snails and slugs are involved in the life cycle of lungworms as obligate intermediate hosts. Currently these neglected parasites are considered as spreading in Europe and emerging in previously non-endemic areas. Therefore, aim of this study was firstly to evaluate lungworm larvae infections in native terrestrial gastropod populations, and secondly, to address potential geographic expansion of these parasitoses into other islands of Macaronesian Archipelago in Spain.

Methodology

Overall, 131 specimens of native terrestrial gastropods (see Fig. 1) were collected during December 2018 to April 2019 from the Archipelago of Macaronesia, Spain (24° 15′ 24″ N, 22° 28′ 16″ W). Gastropods were sampled in 27 selected locations from Tenerife, Gran Canaria, La Palma, Lanzarote, El Hierro and Fuerteventura. After species identification samples were examined microscopically via artificial digestion for the presence of lungworm larvae. Metastrongyloid larvae species and stages were morphologically identified (see Fig. 2).

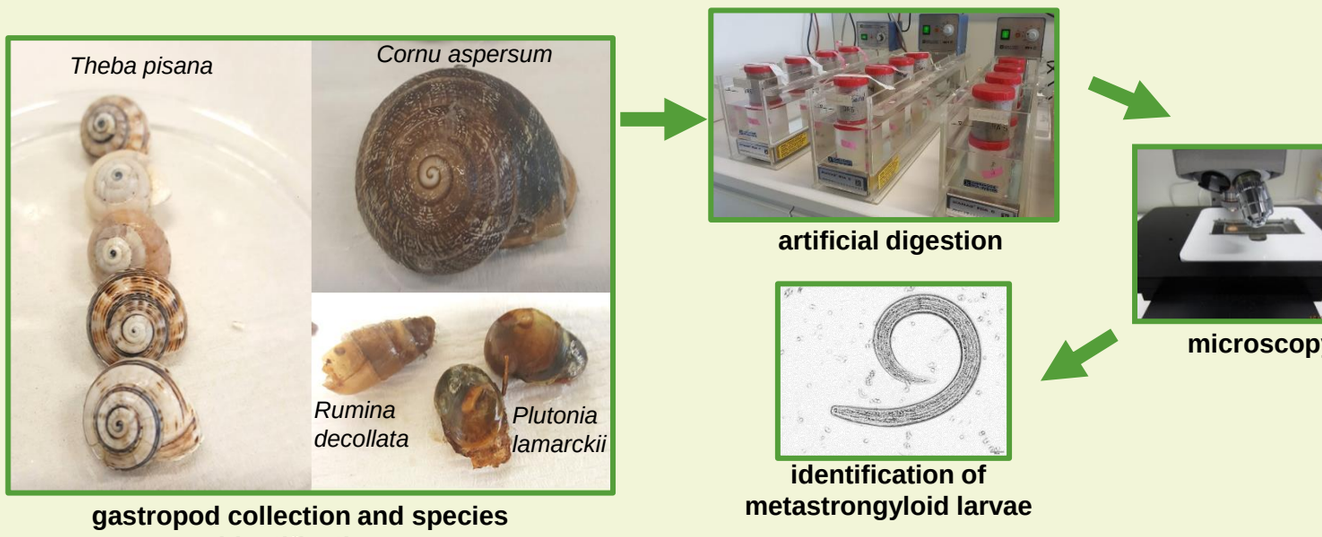

Figure 1: Experimental procedure

Results

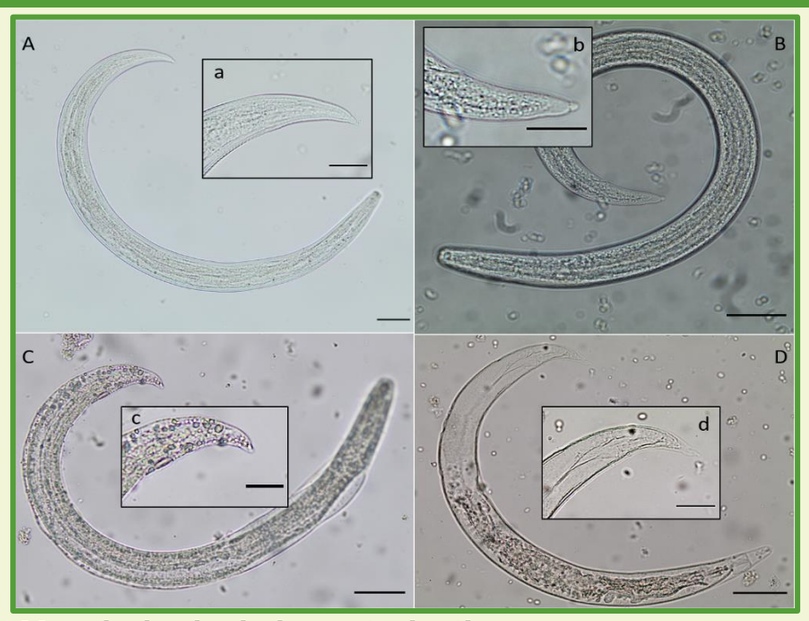

Figure 2: Morphological characterization

Third stage larvae of *Angiostrongylus cantonensis* (A), *Aelurostrongylus abstrusus* (B) and *Angiostrongylus vasorum* (C); D shows an *A. vasorum* second stage larva, in the sheath of a first stage larva; details of the posterior ends are shown in a, b, c and d; The third stage larva of *A. cantonensis* can be identified by its tail pointed tip (a), whereas the *A. abstrusus* L3 (b) has a terminal rounded knob and the *A. vasorum* L3 is characterized by a short digitiform posterior end (c); The tail of an *A. vasorum* L1 shows a dorsal spine (d)
scale bar (A, B, C, D) 40µm; scale bar (a, b, c, d) 20µm

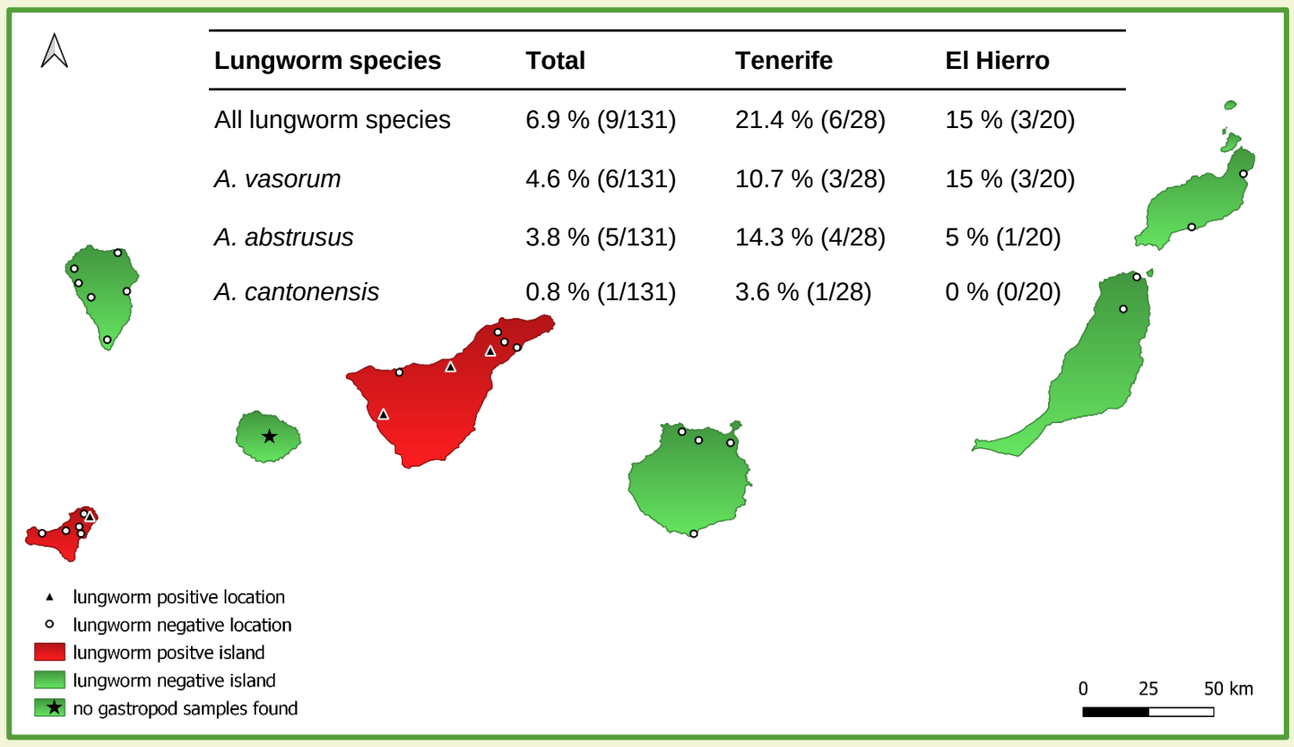

Figure 3: Prevalence of metastronglyoid lungworms in intermediate hosts in Macaronesia, Spain

Current study revealed a total prevalence of 0.8% for *A. cantonensis*, 4.6% for *A. vasorum* and 3.8% for *A. abstrusus* in Macaronesian gastropods. In Tenerife, all three lungworm species were found thereby reconfirming endemicity of *A. cantonensis* for this island. *Cornu aspersum* snails originating from El Hierro were positive for *A. abstrusus* and *A. vasorum* with prevalences of 5% and 10%, respectively, showing larval burdens of up to 290 larvae per specimen.

Conclusion

This epidemiological study expands the geographic distribution of human, canine and feline lungworm species in Europe. The current data, particularly on anthropozoonotic relevant *A. cantonensis,* call for a regular large-scale monitoring on intermediate hosts, paratenic hosts and final hosts to avoid further spread of lungworm-related diseases in man and animal.

Acknowledgements

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