

Borrelia burgdorferi s.l. among questing ticks and small mammals in northern Spain natural reserve (Sierra del Suevo-Asturias)

Alberto Espí⁽¹⁾, Ana Del Cerro⁽¹⁾, José Miguel Prieto⁽¹⁾

⁽¹⁾ Servicio Regional de Investigación y Desarrollo Agroalimentario (SERIDA), Gijón, Asturias, Spain

aespi@serida.org

Introduction

Lyme borreliosis is an arthropod-borne disease distributed worldwide and the most common tick-borne disease of humans in the northern hemisphere. Small mammals have been described as important reservoir host for *Borrelia burgdorferi* sensu lato in different European studies.

This study was conducted to assess the presence of *Borrelia burgdorferi* s.l., the causative agent of Lyme Borreliosis, in questing ticks and small mammals in Asturias.

Materials and methods

Study area



Province of Asturias (Spain) Natural Reserve "Sierra del Suevo"

Questing ticks sampling

Host-seeking ticks were collected at 6 different areas. Sampling at each site was conducted twice a month from April 2010 to December 2013.



Blanket dragging

Tick on blanket

Small mammal sampling

Small mammals were captured, between October 2012 and October 2013, in the same areas.

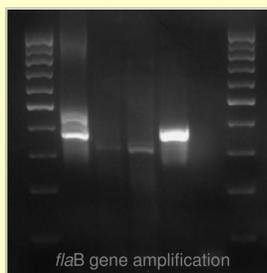


Apodemus sylvaticus

Ticks on small mammal ear

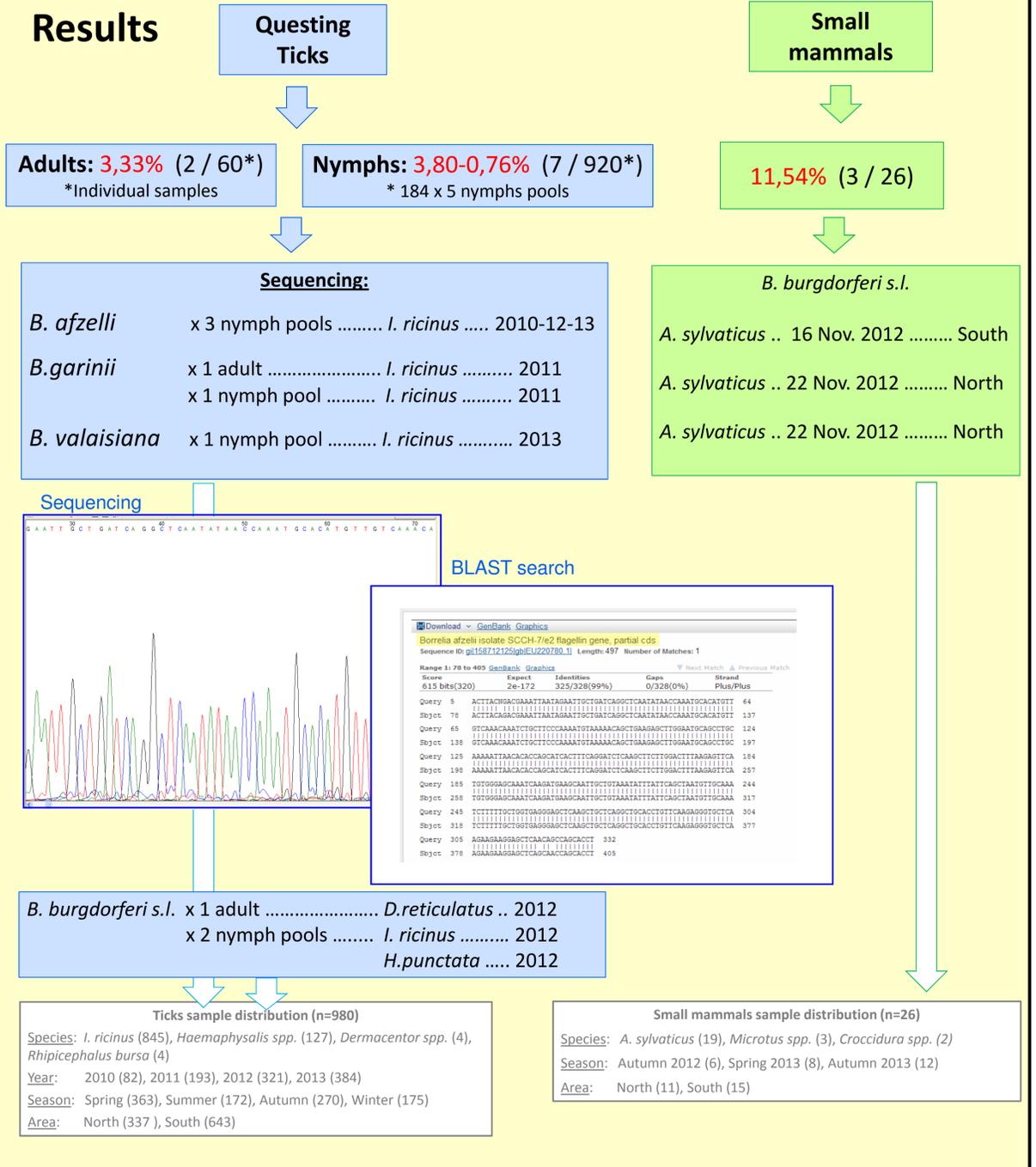
PCR analysis and sequencing

920 nymphs (184 pools) and 60 adults (individual samples) ticks, as well as 26 small mammals' tissue pools, were examined by polymerase chain reaction (PCR) for the presence of *Borrelia burgdorferi* s.l. (Clark et al., 2005). In positive PCR samples, the *rrs-rrlA* intergenic spacer was sequenced for species identification (Bunikis et al., 2004).



flaB gene amplification

Results



Conclusions

The natural reserve "Sierra del Suevo" is densely inhabited by ticks. Results of dragging showed a nymph abundance index of 24.3 in 2012 and 60.1 in 2013 mainly due to *I. ricinus* species but also to *Haemaphysalis punctata* and *H. concinna*. Other tick species (*H. inermis*, *Dermacentor reticulatus*, *Rhipicephalus bursa*), were collected less frequently.

Borrelia burgdorferi s.l. was detected from 3.3-7.7% nymphs collected in 2010, 0.5-2.7% in 2011, 1.0-5.0% in 2012, 0.5-2.7% in 2013 and 0.5-2.7% in 2013, as well as in 12.5% of adults collected in 2011 and 4.8% in 2012.

Borrelia burgdorferi s.l. was also detected from 11.5% (3/26) small mammals. Three different genospecies (*B. afzelli*, *B. garinii* and *B. valaisiana*) were identified from the questing ticks.

The detection of *Borrelia burgdorferi* s.l. among questing ticks and small rodents, as well as the tick abundance and the presence of large populations of wild and domestic animals, indicate that the risk of infection in this area is relevant. This is also in accordance with clinical reports of Lyme disease from local hospitals.

Literature cited

Bunikis, J., Garpmo, U., Tsao, J., Berglund, J., Fish, D., & Barbour, A. G. (2004). Sequence typing reveals extensive strain diversity of the Lyme borreliosis agents *Borrelia burgdorferi* in North America and *Borrelia afzelli* in Europe. *Microbiology*, 1741-1755.

Clark, K., Hendricks, A., & Burge, D. (2005). Molecular identification and analysis of *Borrelia burgdorferi* sensu lato in lizards in the southeastern United States. *Appl Environ Microbiol*, 2616-2625.

Acknowledgments

Ana L. García Pérez and Jesse Barandika (NEIKER) for providing the PCR positive control. Funded by INIA (Project No. RTA2011-00008-C2-01) and FEDER

