

Driving forces for change in geographic distribution of *Ixodes ricinus* ticks in Europe

> **J. Medlock**¹, K.M. Hansford¹, A. Bormane², M. Derdakova³, A. Estrada-Pena⁴, J.C. George⁵, L. Golovljova⁶, T. Jaenson⁷, J.K. Jensen⁸, P. Jensen⁹, M. Kazimirova¹⁰, J. Oteo¹¹, A. Papa¹², K. Pfister¹³, O. Plantard¹⁴, S.E. Randolph¹⁵, A.P. Rizzoli¹⁶, M.M. Santos-Silva¹⁷, L. Vial¹⁸, M. Braks¹⁹, H. Sprong¹⁹, H. Zeller²⁰, W. Van Bortel²⁰

¹ Medical Entomology & Zoonoses Ecology Group, Emergency Response Department, Health Protection Agency, Porton Down, Salisbury, Wiltshire, United Kingdom

² Department of the Epidemiological Surveillance of Infectious Diseases and Immunisation, Riga, Latvia

³ Parasitological Institute, Kosice, Slovakia

⁴ University of Zaragoza, Zaragoza, Spain

⁵ Physician, Sovilly, France

⁶ National Institute for Health Development, Tallinn, Estonia

⁷ University of Uppsala, Sweden

⁸ Nolsoy, Faroe Islands

⁹ University of Copenhagen, Denmark

¹⁰ Slovak Academy of Sciences, Bratislava, Slovakia

¹¹ Hospital San Pedro - Centro de Investigación Biomédica de La Rioja, Spain

¹² University of Thessaloniki, Greece

¹³ University of Munich, Germany

¹⁴ Ecole Nationale Vétérinaire, Agroalimentaire et de l'Alimentation, Nantes, France

¹⁵ Oxford University, United Kingdom

¹⁶ Istituto Agrario di San Michele all'Adige, Italy

¹⁷ Instituto Nacional de Saúde Dr. Ricardo Jorge, Lisbon, Portugal

¹⁸ Cirad, Montpellier, France

¹⁹ RIVM, Bilthoven, The Netherlands

²⁰ European Centre for Disease Prevention and Control, Stockholm, Sweden

Many factors are involved in the latitudinal and altitudinal spread of *Ixodes ricinus* as well as in changes in the distribution within its known endemic zones. The drivers can be divided into those directly related to climatic change, those related to changes in the distribution of tick hosts or other ecological changes and anthropogenic induced changes. These factors are strongly interlinked and often not well understood or quantified. Better understanding and mapping of the spread of *Ixodes ricinus* is however essential to assess the risk of the spread of diseases transmitted by this vector species. Enhanced tick surveillance with harmonized approaches for comparison of data enabling the follow-up of trends at EU level will improve the messages on risk related to tick-borne diseases to policy makers, other stake holders and to the general public.