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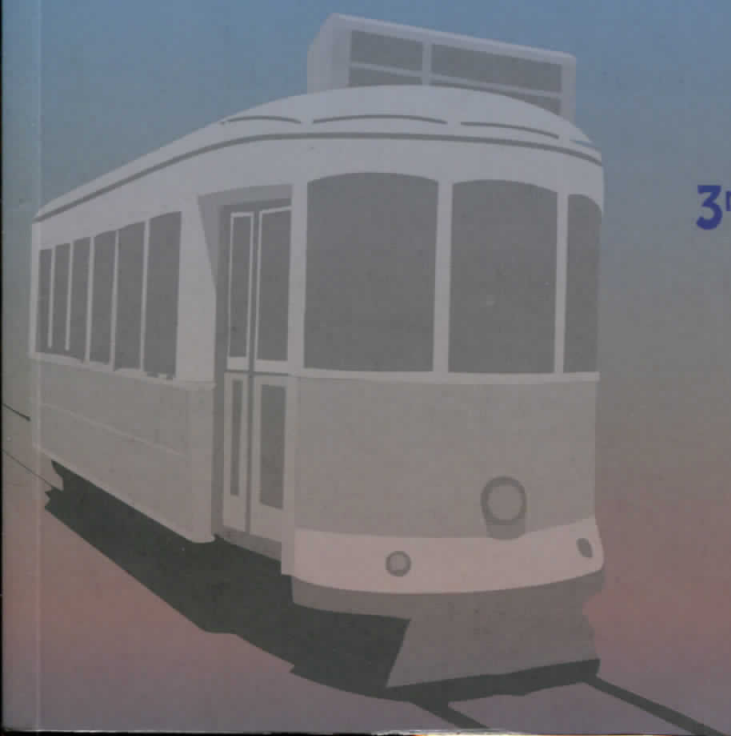
When vectors collide with cultures: 'anthropo-vector ecology', who is controlling who?



3rd - 7th October 2016
Lisbon – Portugal

European Society for Vector Ecology

EAN: 978-90-8686-291-7
e-EAN: 978-90-8686-837-7
ISBN: 978-90-8686-291-7
e-ISBN: 978-90-8686-837-7
DOI: 10.3920/978-90-8686-837-7

Cover design: Marcos Santos

First published, 2016

Wageningen Academic
P u b l i s h e r s

Fossil records and evolution of haematophagy in biting midges (Diptera: Ceratopogonidae)

R. Szadziewski, P. Dominiak, E. Sontag, A. Urbanek and J. Szwedo
University of Gdańsk, Department of Invertebrate Zoology and Parasitology, Wita Stwosza 59, 80-308 Gdańsk, Poland; heliocopris@gmail.com

We are not going to discuss which theory explains more accurately why dinosaurs went extinct, and what the main factors responsible for the evolutionary success of mammals were. Nor have we anything to say about the diseases affecting vertebrates from the Jurassic to the Neogene, even though some data on fossil parasitic protozoans can be found in the literature. However, we do intend to shed some light on the evolution of biting midges, a family of nematocerous flies containing species familiar as annoying bloodsucking pests and vectors of various pathogens, bothering vertebrate hosts probably ever since the Jurassic (over 176 Mya). Ceratopogonids, represented in the recent fauna by over 6,200 species, are well documented as fossils, especially in amber inclusions. More than 280 fossil species belonging to 48 genera (25 extant, 23 extinct) have been described, with the oldest one dated to 142 Ma (Lower Cretaceous). 112 of these species – from the subfamilies Lebanoculicoidinae and Leptoconopinae, the genera *Archiculicoides* and *Culicoides*, and the subgenus *Lasiohelea* of *Forcipomyia* – fed on vertebrate blood. Haematophagy is obviously a plesiomorphic condition in biting midges, and all basal lineages are considered to be bloodsucking parasites. The relict genera *Leptoconops* and *Austroconops*, as well as 6 extinct genera, are known from Lebanese amber (130 Ma). The genus *Culicoides* is younger, and to date has been reported from the French amber of Vendée (95-85 Ma) and New Jersey amber (93 Ma), however, our present study extends the history of this group back to 100 Ma. Other feeding habits among biting midges evolved later, mainly in the Upper Cretaceous (haemolymphophagous, predators) and the Paleogene (pollinophagous, nectarophagous, further predatory taxa). At the same time (45 Mya) haematophagy developed for the second time in the subgenus *Lasiohelea*. The evolution of feeding behaviours is correlated with morphological modifications, especially of the mouthparts, and the distribution of antennal sensilla coeloconica involved in host-seeking.

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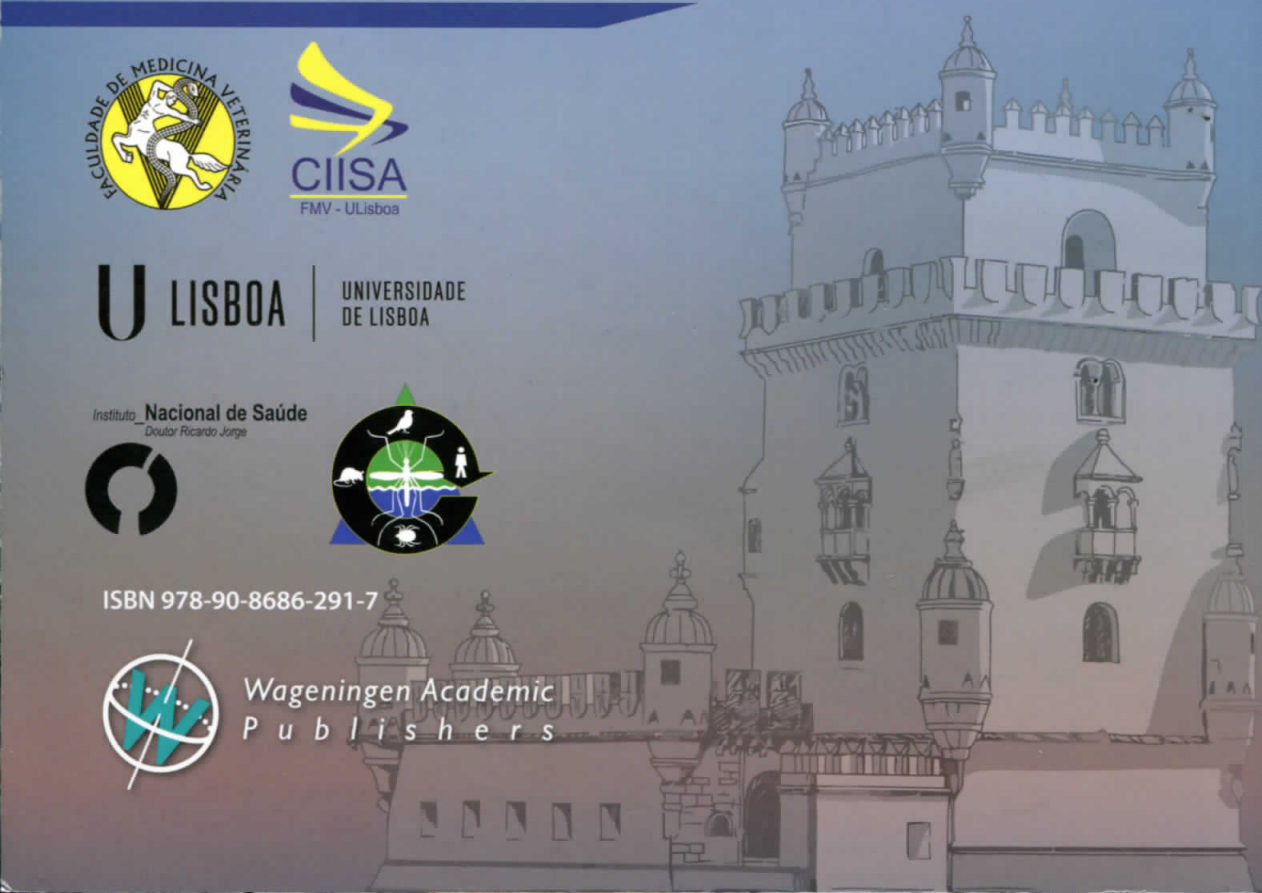

ISBN 978-90-8686-291-7

Wageningen Academic
Publishers