A Mini-review of Culicoides (Diptera: Ceratopogonidae) Fauna and its Vectorial Role in Tunisia

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Abstract
Following the bluetongue outbreaks in Tunisia from 1999 to 2006, bluetongue virus serotype 2 was isolated and several entomological investigations were performed. The present study reviewed the current status of Culicoides fauna in Tunisia and their role as proven and potential vectors of bluetongue virus based on the available and scattered reports. In total, about 35 species of Culicoides are known to occur in the country. Culicoides imicola is considered as the main and the proven vector of bluetongue virus. Other species of the genus Culicoides were suggested as potential vectors bluetongue virus. We cited mainly Culicoides obsoletus, Culicoides scriptionis, Culicoides dewulfi and Culicoides pulicaris. Priority recommendations to prepare the country for future veterinary health challenges were suggested.

Keywords: Culicoides imicola; Bluetongue virus; Veterinary health; Tunisia

Introduction
Biting midges of the genus Culicoides (Diptera: Ceratopogonidae) are hematophagous insects found in tropical and temperate countries. These insects have an importance veterinary health importance by transmitting several pathogens [1,2]. Actually, about 1316 biting midges species have been identified and 50 arboviruses have been found inside species of Culicoides considered later as vectors [3,4]. Recently, Schmallenberg bunyavirus (genus Orthobunyavirus; Bunyaviridae) have been isolated in Culicoides species in Europe [5,6]. The aim of the present study was to review the species composition of Culicoides fauna in Tunisia and their role as proven and potential vectors of bluetongue virus.

Current Species Composition of Culicoides Fauna in Tunisia
Entomological investigations carried out in Tunisia have reported an increasing number of species during the last decades. In total, about 35 species of Culicoides are actually present in the country [7-11]: Culicoides imicola kieffer, 1913; Culicoides obsoletus Meigen, 1818; Culicoides circumscriptus Kieffer, 1918; Culicoides newsteadi Austen, 1921; Culicoides punctatus Meigen, 1804; Culicoides parroi Kieffer, 1922; Culicoides puncticollis Becker, 1903; Culicoides rietih Kieffer, 1914; Culicoides catanieri Clastrier, 1957; Culicoides corsicus Kremer, 1971; Culicoides jegelensis Dzhabarov, 1964; Culicoides griseidorsum Kieffer, 1918; Culicoides heterolactus Kremer and Callot, 1965; Culicoides jumineri Callot and Kremer, 1969; Culicoides longipennis Khalaf, 1957b; Culicoides maritimus Kieffer, 1924; Culicoides pseudopallidus Khalaf, 1961; Culicoides santonicus Callot, Kremer, Rault and Bach, 1966; Culicoides seminaculatus Clastrier 1958a; Culicoides sergenti Kieffer, 1921b; Culicoides submaritimus=C. maritimus Borkent 2008; Culicoides univittatus Vimmer, 1932; Culicoides saevus Kieffer, 1922g; Culicoides kingi Austen, 1912; Culicoides fascipennis Staeger, 1839; Culicoides subfascipennis Kieffer, 1919a; Culicoides sahariensis Kieffer, 1923a; Culicoides kurensis Dzhabarov, 1960; Culicoides langenonti Kieffer, 1921; Culicoides lailae A; Culicoides lailae B=C. odiatus Borkent 2008; Culicoides marceli Callot, Kremer and Basset, 1968; Culicoides odiatus Austen 1921; Culicoides indistinctus=C. odiatus Borkent, 2008; Culicoides paolae Boorman, 1996.

Vectorial Role of Culicoides as Proven and Potential Vectors in Tunisia
Culicoides imicola is considered as the main and the proven vector of bluetongue virus and African horse sickness virus viruses Africa, Middle East, southern Asia and southern Europe [12,13]. The two pathogens are responsible of devastating diseases in ovine and equidae, respectively. It is important to note that other species including Culicoides obsoletus, Culicoides scriptionis, Culicoides dewulfi and Culicoides pulicaris are considered as known or potential bluetongue virus vectors [14-20]. In Tunisia, the first outbreaks of bluetongue virus (BTV) were identified in 1999 causing a dramatic sanitary and economical crisis in the country [21]. Later, two serotypes including BTV-2 and BTV-1 have arisen in 2000 and 2006, respectively [8]. In 1999, the first outbreak appeared in eastern Tunisia along the coast. An important rate of morbidity and mortality rates were recorded reaching 8.35% and 5.5% respectively [22]. One year later, 72 outbreaks affecting 6,120 sheep were recorded in eastern and central Tunisia. Vaccination campaigns were undertaken in sheep flocks by veterinary health authorities in order to control the propagation of the disease.

Priority Recommendations to Prepare the Country for Future Veterinary Health Challenges
Control against bluetongue disease consists to ameliorate our knowledge of the epidemiology of blue tongue and to better understand the vectors ecology. The dominance of Culicoides imicola compared to other collected species highlights the risk of emergence of new diseases. Further entomological investigations are essential to continue the surveillance of other potential and to limit the propagation of the disease in the country. Understanding what a vector is to evaluate and predict vector transmission risks, improve current control methods and develop new approaches and Coordinating multidisciplinary research efforts are the main and priority recommendations to prepare the country for future veterinary health challenges.

References

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