

Case Report

First Detection of *Aedes (Stegomyia) albopictus* (Diptera: Culicidae) in Algiers, the Capital City of Algeria

*Kamel Eddine Benallal, Rafik Garni, Lazhari Bouiba, Zoubir Harrat

Laboratoire d'Eco-épidémiologie Parasitaire et Génétique des Populations, Institut Pasteur d'Algérie, Route Petit Staouéli, Dely Ibrahim, Alger, Algérie

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Abstract

Background: Based on the reporting of the presence of stripped mosquitoes by a citizen in the Algiers residential neighborhood of Bir-Khadem, where residents experienced huge daytime mosquito nuisance an entomological investigation was carried out in July 2016.

Methods: Ovitrap and BG sentinel traps baited with Lure were used during three consecutive days to collect adult mosquitoes. Eighteen residential houses of the Bir-Khadem neighborhood were also inspected to search larvae breeding sites such as water fountains, baskets and flowerpots.

Results: A total of 57 *Aedes albopictus* specimens were collected in five villas, consisting of 21 eggs, 20 larvae and 16 adults.

Conclusion: This is the first record of this invasive species in Algiers.

Keywords: *Aedes albopictus*, Mosquitoes, Arbovirus, Algiers, Algeria

Introduction

Aedes albopictus is currently considered the most invasive mosquito species (1) as its rapid adaptation to a large variety of environments in both tropical and temperate areas has allowed its spread throughout the world (2). Indeed, *Ae. albopictus* larvae can breed in different container forms (3). As early as 1968, *Ae. albopictus* was reported as the most common and widespread mosquito in Southeast Asia (4). In 1979, this mosquito was reported in Albania (5) then in several countries in Europe, around the Mediterranean basin and in Morocco (6, 7). Doubtlessly, the worldwide dispersion of *Ae. albopictus* is mainly caused either by trade in used tires or lucky bamboo between the continents and by travelers and cars within land (8, 9).

Beside its huge nuisance, *Ae. albopictus* capacity to spread could engender a serious threat for the public health since it is competent to transmit several viruses (10). This mosquito has been responsible for the large out-

break of Chikungunya in La Réunion Island and focal transmission of Dengue and Chikungunya in Europe (11–13). Since then because of its ability to adapt to different environments, this mosquito species is under scrutiny by many health services. It has also been shown to be competent for Zika virus (10, 14) but its role in the current Zika epidemics needs further investigation. *Aedes albopictus* is also known as a vector for West Nile virus (15, 16), *Dirofilaria immitis* and *D. repens* (17, 18). In Algeria, it was reported on three occurrences (19–21), but never in Algiers, the capital city of Algeria.

In July 2016, a citizen contacted our laboratory to complain from strange mosquitoes that caused painful bites and huge daytime nuisance. The herein entomological survey led to the identification of *Ae. albopictus* in the district of Bir-Khadem and assessed its spread in the district.

Materials and Methods

Bir-Khadem is a locality of Algiers (altitude 84m, 36.716460° N, 3.042561° E), population number 77. 749 persons located about 6km from the commercial port and 16km off the international airport. In Algiers, Mediterranean climate occurs with a mean 686mm rainfall per year and a mean temperature of 23 °C.

A citizen living in a residential neighborhood brought to our laboratory some mosquito specimens collected in his house. These mosquitoes bite during daytime and made a huge nuisance, which was suggestive of *Ae. albopictus*. Following this, sampling procedures for detecting invasive mosquitoes were implemented in that neighborhood.

Two Biogents-Sentinel™ trap (BGS) (Biogents AG, Regensburg, Germany) baited with BG-Lure (BGL) a mosquito attractive were run outside in the gardens (first at the house of the complainer and the second at the house of the Asian persons) for three consecutive days to collect adult mosquitoes. A total of 18 residential houses of the Bir-Khadem neighborhood were also inspected in order to search possible larval breeding sites such as water fountains, baskets and flowerpots plates. Ovit-raps consisting of black plastic container filled with 400ml of water and leaves provided with a 20× 20× 5cm of polyester piece as a substrate for *Aedes* spp. mosquito oviposition device were placed under trees and in shaded areas (11). The collected adult and larvae specimens were morphologically identified (22).

A survey with local citizens (18 households) about the first appearance of this mosquito in the area was carried out mainly was around: i) the period of biting and activity of this species (daytime or night), ii) what is new in the neighborhood (the installation of new people, a new commercial activity especially that of used tires or the sale of exotic plants), iii) the notion of travel in countries endemic to *Ae. albopictus*. All these questions were asked

in order to find an explanation how this mosquito has come to this area since it was reported established only in Oran which is distanced about 500km from Algiers (21).

Results

The eight mosquitoes (two males and six females) collected by the citizen belonged to *Aedes* genus showed black and white stripes showed black and white stripes on their legs and a medio-dorsal white stripe on the thorax characteristic of *Ae. albopictus*. Out of the 18 residential houses prospected 4 were positives with *Ae. albopictus* in association with *Culex pipiens* and *Culiseta longiareolata* around the Asian foreign villas (Table 1, Fig. 1). A total of fifty-seven adults of *Ae. albopictus* (male and female) were identified either collected at adult stages or emerged from larvae and nymphs.

The survey carried out with local citizens revealed that this species bites in daytimes and had appeared one month before in June and coincided with the installation of Asian persons who work for a building company in Algiers. They had not reported new commercial activities (tires or plants) since it was a residential quarter. Concerning travelling notion no one had been in an endemic area of *Ae. albopictus*.

Table 1. Location and stage of *Aedes albopictus* collected during the survey

House	Specimen numbers		
	Adultes	Larvae	Eggs
P1	13	15	7
P2	11	/	/
P3	/	/	6
P4	/	5	/
Total	24	20	13

P1: villa where first specimens were collected, P2: foreign's villa, P3: second positive villa, P4: third positive villa



Fig. 1. Location of *Aedes albopictus* captures at different development stages

Discussion

An entomological survey was implemented in a residential neighborhood of Bir-Khadem in order to identify the mosquito species implicated in the source of nuisance. As suspected, several specimens of *Ae. albopictus* were found. Residential houses with garden, swimming pool, vegetation, trees and animals provide suitable environmental conditions for this species to reproduce. In addition, the stability of good climate conditions during June till August 2016 (mean temperature 25 °C) has allowed *Ae. albopictus* to reproduce and colonize easily this area. The occurrence of this species in this locality with mean annual precipitation of 686 mm is of great interest since over most of its range is associated with very heavy rainfall (23).

BG-Sentinel traps and ovitraps allow the collection of few specimens only. This suggests that *Ae. albopictus* population is still at low level despite favorable environmental conditions or at the beginning of its introduction. Besides, the questionnaire survey carried out with the citizens revealed that this mosquito had appeared since June 2016. One might wonder

whether the source of *Ae. albopictus* could be some eggs carried in the plants that they brought from their country and cultivated in their garden for their own consumption since no commercial activity nor tire manufactory are registered in this area.

Aedes albopictus is well established all around the Mediterranean basin and risk-mapping modeling showed that Northern Algeria is suitable for its installation (24). Since the report of dengue and Chikungunya in Europe (25, 26) and several cases of West Nile in Algeria (27, 28), the Algerian Government has established an arbovirus surveillance system according to the International Health Regulation. Unfortunately, the surveillance system set-up has not allowed the early detection of *Ae. albopictus* introduction into Algeria but thanks to the vigilance of inhabitants who reported these mosquitoes which proves that implication of citizens remains the most important way to report and monitor the establishment of invasive mosquitoes (11). Even if insecticide (Allethrin) spraying was performed by Algiers Board of

Health to eliminate adults before possible establishment, a continuous surveillance with ovitraps and BG-sentinel traps is highly recommended to monitor its extension area since *Ae. albopictus* is known to skip oviposition and to release its eggs in several breeding sites (29).

A good communication campaign in radio and television should be also planned as it is a new mosquito species with new behavior in order to explain to citizens how avoiding the development of this species in their garden and how to limit its propagation by simple gestures like covering the water barrels, emptying the flowerpot plates, removing unnecessary utensils from the gardens and the surrounding areas that may contain water and help the pullulation of these mosquitoes. Such measures need to be planned before for limiting *Ae. albopictus* propagation to other areas and to avoid the massive using of insecticides for vector control which could favor the appearance of resistance with time.

Conclusion

The fourth record of *A. albopictus* in Algeria suggests that the surveillance system efficiency must be improved by sensitizing and implicating population awareness for this mosquito species in time. Furthermore, involvement of *Ae. albopictus* in the transmission of Dengue, Chikungunya, and Zika viruses from viremic persons highlights the importance of monitoring this invasive species to assess the health risk. Further studies are recommended to determine the origin of the specimens collected in Algiers, and to investigate the ecology and sensitivity to insecticides of this species in case it establishes in Algiers for planning adapted and efficient control measures.

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