

The first report of *Aedes (Stegomyia) albopictus* in Haiti

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Aedes albopictus was found in six of the 10 departments of Haiti and in 14 of the 35 communes surveyed. The survey found the larvae of *Ae. albopictus* in 13 different types of containers. Used tires and tins were by far the most common breeding sites used by this mosquito species. At the breeding sites, *Ae. albopictus* was associated with other mosquito species, such as *Aedes aegypti*, *Culex nigripalpus* and *Aedes mediovittatus*. The highest proportion of association was with *Ae. aegypti*. This study represents the first report of *Ae. albopictus* in Haiti.

Key words: *Aedes albopictus* - habitats - Haiti

Aedes albopictus has spread throughout America, Europe, Africa and Oceania during recent decades from its original area of distribution in southeast Asia (Forattini 1986, Sprenger & Wulthiranyagool 1986, Gonzalez & Marro 1999, Fontenille & Toto 2001, Gratz 2004, Schaffner et al. 2004, Gimenez et al. 2007, Scholte et al. 2007, Wymann et al. 2008, Navarro et al. 2009, Gatt et al. 2010). *Ae. albopictus* has been reported in the Dominican Republic, located east of Haiti on the island of Hispaniola (Peña 1993). However, information about the presence of this mosquito in Haiti is not available. *Ae. albopictus* is susceptible to several arbovirus infections and is capable of transmitting at least 24 of them. In particular, *Ae. albopictus* is susceptible to oral infection by the following diseases, which can be transmitted by the bites of this mosquito: dengue, eastern equine encephalitis, Potosi, Chikungunya, La Crosse encephalitis and West Nile. Additional diseases are similarly associated with this species (Gerhardt et al. 2001, Sardelis et al. 2002, Benedict et al. 2007, Dehecq et al. 2011). The aims of this paper are to document the presence of *Ae. albopictus* in Haiti and to report its breeding sites and association with other mosquito species in the country. Haiti is located in the western part of the island of Hispaniola. Its capital, Port au Prince, was severely damaged by an earthquake in January 2010. Sampling was conducted in 35 communes belonging to the 10 departments that constitute the Republic of Haiti. Water can collect in containers in the courtyards of the houses. These containers were inspected as part of a program established to monitor *Aedes aegypti* in the period from May-December 2010. It should be noted that sampling was conducted only from the exterior of the premises and homes. All containers with water were examined, but inspections were

not performed inside the houses out of respect for the customs of the local population. The survey included all human settlements and tents used as local housing. Such housing units are common in areas affected by the earthquake. The survey covered a radius of one kilometre around the Community Reference Hospitals operated by the Cuban Medical Brigade in Haiti. The work was performed by trained vector control personnel located in each area studied. Up to 20 mosquito larvae, depending on the container size, were collected per sample using a 3 mL plastic pipette and placed in vials of 70% alcohol. The vials were labelled with the data collection site, date and container type. Illustrated keys for the mosquito vectors of dengue were used to identify the samples (Rueda 2004, Gonzalez 2006). *Ae. albopictus* was found in six of the 10 departments of the Republic of Haiti. The mosquito was found in 14 (40%) of the 35 communes surveyed. The departments, communes and number of containers with *Ae. albopictus* were as follows: Arcahaie (2), Thomazeau (7), Carrefour (9), Port-au-Prince (2) (west department), Cayes Jacmel (2) (southeast department), Saint-Marc (9), Verrettes (14) (department of Artibonite), Corail (2), Jeremie (2), Anse du Hainault (2) (department of Grand Anse), Port Salut (9), Camp Perrin (6), Les Cayes (2) (southern department) and Mirebalais (6) (centre department) (Figure). The survey found larvae of *Ae. albopictus* in 13 different types of containers. Used car tires (19, 25.7%) and tins (10, 13.6%) were by far the most frequent types of breeding sites used by this species (Table I). At the breeding sites, *Ae. albopictus* was associated with other mosquito species, such as *Ae. aegypti*, *Culex nigripalpus* and *Aedes mediovittatus*. Of the 74 containers in which *Ae. albopictus* was found, 43.2% harboured only *Ae. albopictus*, whereas the other containers harboured one or more additional mosquito species. The highest proportion of association, 76.2% (32/42), was with *Ae. aegypti*. (Table II). Only 14 of the 35 communes surveyed reported the presence of *Ae. albopictus*. However, this finding does not mean that this species is not present in the other communes. It is necessary to develop further research on this mosquito, primarily in rural areas and during other periods of the year,

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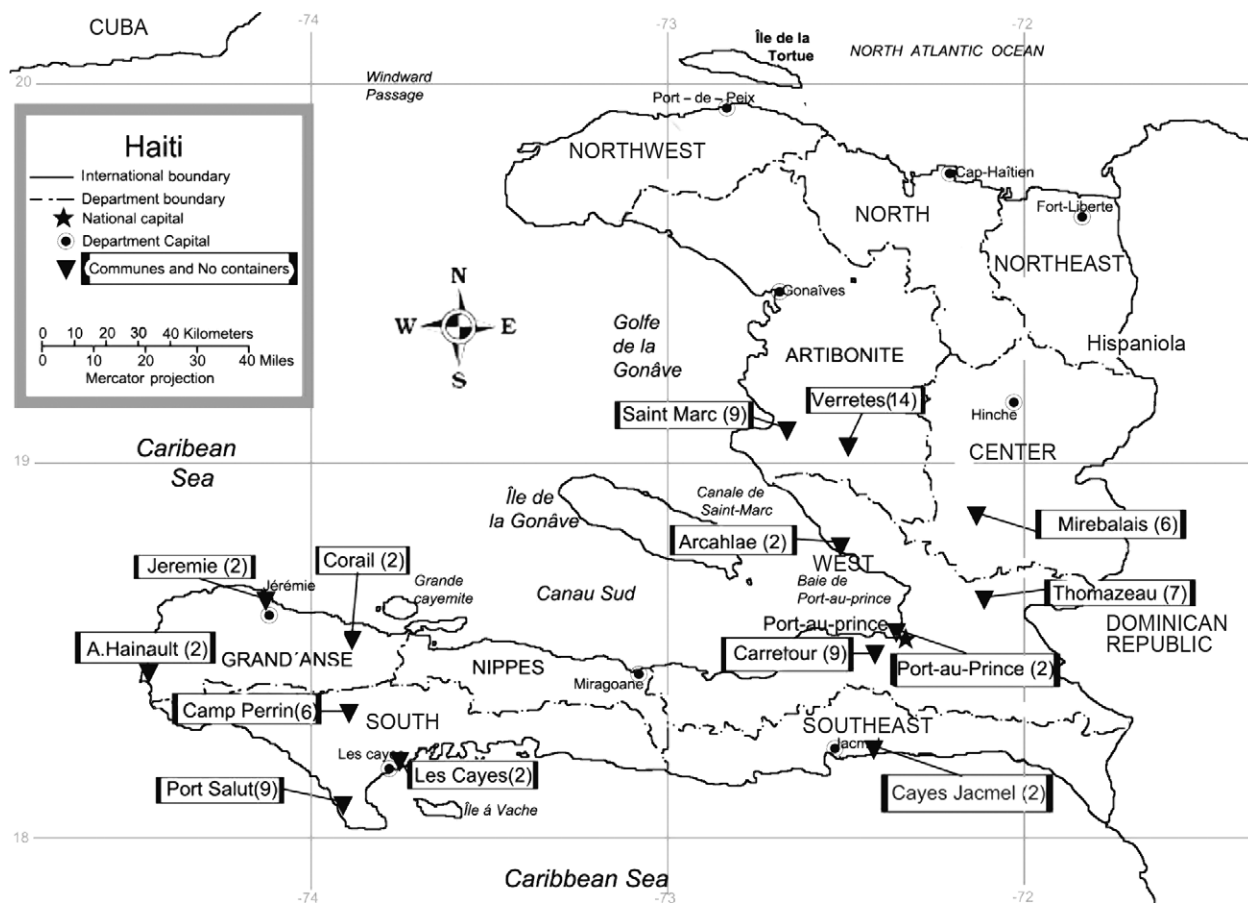
Distribution of the communes and number of containers with *Aedes albopictus* presence in Haiti.

TABLE I
Number of containers with
Aedes albopictus larval presence, Haiti, 2010

Type of container	Containers n (%)
Tree hole	7 (9.4)
Car used tires	19 (25.7)
Drums > 30 gallons (metal, plastic, cement)	4 (5.4)
Tins	10 (13.6)
Little drums < 30 gallons (metal, plastic, cement)	7 (9.4)
Bottles	3 (4.1)
Cartoon boxes	2 (2.7)
Car, fridges, other electro domestic equipment discarded	7 (9.4)
Plates under flower pots	2 (2.7)
Animal drinking bowls	2 (2.7)
Cisterns	2 (2.7)
Plastic cups	4 (5.4)
Bowls	5 (6.8)
Total	74

to obtain additional information and to obtain a complete picture of the distribution of *Ae. albopictus* in the country. Several factors affect the dispersal and establishment of *Ae. albopictus* in Haiti. Climatic factors favour the development and the life cycle of this mosquito. The steady migration of populations between departments in search of better living conditions favours the passive transport of this mosquito by road or other vehicles carrying the adult stage. In addition, the species can be dispersed and established from mosquito eggs in used tires in illegal landfill in both urban and rural areas.

All these factors, in combination with the intrinsic genetic variability of *Ae. albopictus* and the ability of the species to adapt physiologically and ecologically, promote the rapid colonisation of new areas (Gratz 2004, Paupy et al. 2009).

Moreover, this study demonstrated the reported ability of *Ae. albopictus* to complete its pre-imaginal development in a wide variety of containers, primarily generated by human activities. The earthquake that Haiti experienced in January 2010 caused a deterioration of the infrastructure in much of the country. The population faced a water supply crisis and environmental management worsened. In general, sanitation is poor in the communes. The presence of a variety of containers facilitates the breeding of *Ae. albopictus*. This mosquito's use of such containers to support its ecological plasticity

TABLE II
Aedes albopictus and its association
with other mosquito species, Haiti, 2010

Mosquito association	Containers n (%)
<i>Ae. albopictus</i>	32 (43.2)
Sub total container with one mosquito specie	32 (43.2)
<i>Aedes aegypti</i> - <i>Ae. albopictus</i>	32 (43.2)
<i>Ae. albopictus</i> - <i>Aedes mediovittatus</i>	6 (8.2)
<i>Ae. albopictus</i> - <i>Culex nigripalpus</i>	2 (2.7)
<i>Ae. albopictus</i> - <i>Ae. aegypti</i> - <i>Ae. mediovittatus</i>	2 (2.7)
Sub total container with two or more mosquito species	(56.8)
Total	74 (100)

and behaviour is similar to that reported from different areas of the world (Estrada & Craig 1995, Marquetti et al. 2000, Gratz 2004, Valdés et al. 2009). The current study is the first report of the presence of *Ae. albopictus* in Haiti. There is a need for additional studies on its distribution and behaviour, its association and competition with other species and its possible role in the transmission of dengue and other viral diseases in the country.

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