



New Species of Arboviruses Mosquito Vectors in Georgia

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Abstract

Purpose: Currently mosquito-borne viral diseases become serious challenge for public health. Vector-borne diseases account for more than 17% of all infectious diseases, causing more than 1 million deaths annually. Because vaccines or antivirals do not exist for most of these viruses, entomological and virological surveillance becomes an essential part of control for these diseases. Information about geographic distribution of mosquito species is needed to identify vector species for targeted control. Arthropod surveillance usually is a useful tool to assess risk for spread of arboviruses. Mosquito surveillance was carried out in Batumi, Georgia, in August 2014. *Aedes albopictus* was detected for the first time, which brings the number of reported mosquito species in Georgia to 32.

Methods: Mosquitoes were collected randomly from 21 sites in Batumi using CDC (Center for disease Control and Prevention) traps with dry ice, backpack aspirator, and mouth aspirators. Mosquitoes for study were collected in houses and outdoor sites. Outdoor localities included tire selling points where the tires with stagnant water were placed in open area which contributed to the excellent conditions for breeding. Mosquitoes have been identified to the species level by microscopy and divided into pools. Collections were made in Batumi during mosquito and arbovirus surveillance training under the Defense Threat Reduction Agency's (DTRA) Cooperative Biological Engagement Program (CBEP). **Results:** *Aedes albopictus* was found first time in the country of Georgia. During the survey also were collected two other species of Mosquito- *Culex pipiens* and *Aedes aegypti*, but 88.1 % of the collected samples were *Aedes albopictus*. This discovery is concerning due to the number of arboviral pathogens they are capable of transmitting.

Conclusions: Batumi is densely populated and has a busy port with rail and road networks that enable the dispersal and/or the introduction of invasive mosquitoes and their associated pathogens. The current knowledge of the species, distribution, and associated pathogens of the mosquitoes in Georgia is limited, but the presence of vectors capable of transmitting Arboviruses (*A. albopictus*, *A. aegypti* and *Culex pipiens*) in Georgia and positive results of serological research for some arboviruses indicates the possible circulation of these pathogens. The results of this study highlight the need for continued arboviruses surveillance, as well as the implementation of vector control programs focusing on preventing mosquito-borne diseases in the country of Georgia.

Introduction

Mosquitoes are recognized as vectors transmitting viral diseases. In an era of environmental change and rapid international movement active entomological surveillance provides a robust and valuable method to determine the risk of human infection with arboviruses. Mosquito surveillance provides a valuable public health tool for assessing the risk of human arboviral infections, allocating limited public health resources, and justifying emergency control actions.

With the Georgian climate trending toward warmer temperatures over the last two decades, an increase in the population of disease vectors is likely, which could potentially correlate with increased incidence of arboviral disease. The most recent studies about the distribution of species of mosquitoes in Georgia have been conducted in early 1950's. Since then no information is available on spatial distribution of mosquitoes or if any new species have entered and reside in the country.

Results

During our survey three different species of mosquitoes were identified:

- *Aedes aegypti*, a mosquito considered to be a primary vector for transmitting Dengue fever, Zika, chikungunya and yellow fever viruses. epidemiologically
- *Aedes albopictus* -an important vector for the transmission of Zika, Yellow fever, Dengue and Chikungunya viruses.
- *Culex pipiens*—a mosquito that can spread West Nile virus. Considered the role of *Culex pipiens* also as vector for Zika virus dissemination.

88.1 % of the collected samples were *Aedes albopictus*. It is first time *Aedes albopictus* is detected in Georgia.

Conclusions

Several possibilities have been proposed to explain the spread of different species of mosquitoes at Black seaside of Georgia, including being transported by shipping, airplanes or wind, migratory birds, or birds in trade, and humans traveling. The large and increasing volume of air traffic makes transport of infected mosquitoes on an airplane a likely pathway.

Batumi is densely populated and has a busy port with rail and road networks that enable the dispersal and/or the introduction of invasive mosquitoes and their associated pathogens. The current knowledge of the species, distribution, and associated pathogens of the mosquitoes in Georgia is limited, but the presence of vectors capable of transmitting Arboviruses (*A. albopictus*, *A. aegypti* and *Culex pipiens*) in Georgia and our serological research for some arboviruses indicates the possible circulation of these pathogens.

The initiated surveillance is the first step in appreciation of their significance for public health. Future information is needed to develop prevention and control strategies in the Georgian vector surveillance activities.

Materials and methods

Surveillance of mosquitoes was initiated in the seaside city of Batumi, Georgia, during August 2014. Mosquitoes were collected randomly from different sites using CDC traps with dry ice, backpack aspirator and mouth aspirators. Mosquitoes for study were collected in houses and outdoor sites. Outdoor localities included tire selling points where the tires with stagnant water were placed in open area which contributed to the excellent conditions for breeding. It was filled standard record forms for locality and other general information. Mosquitoes have been identified to the species level by microscopy and divided into pools for further investigation.

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Figure 1. *Aedes albopictus*



Figure 2. Outdoor site in Batumi