Unusual developing sites of dengue vectors and potential epidemiological implications

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Objective: To identify the unusual breeding sites of two dengue vectors, i.e. Aedes albopictus (Ae. albopictus) and Aedes aegypti (Ae. aegypti). Methods: During the second half of 2010, we performed an occasional survey in rural (Teluk Tempoyak) and urban (Gelugor) areas of Penang Island, Malaysia, to identify cryptic breeding sites. Results: In the rural area, we found heterogeneous immature stages of Ae. albopictus in the water bowl of an encaged bird. We also observed Ae. aegypti eggs deposited in the flush tank of a toilet in the urban area. Conclusions: It can be concluded that both breeding patterns can increase contact with hosts (humans and birds) and presumably population densities of Ae. albopictus and Ae. aegypti, thereby potentially boosting the risks for spread and transmission of arboviral diseases.

1. Introduction

Originating in Africa[1], Aedes aegypti (Ae. aegypti) can now be found in many urbanized areas around the world[2,3], due to its ability to breed in habitats close to humans[4]. This character is shared with another particularly invasive mosquito species, Aedes albopictus (Ae. albopictus)[5,6]. Previously believed to be restricted to South-East Asia forests[7], Ae. albopictus has become well established in the western hemisphere[8]. These two Aedes mosquito species act as vectors of dengue[9], a human disease caused by one of four closely related but antigenically distinct virus serotypes belonging to the genus Flavivirus[10]. About 50%–60% of the projected global population in 2085 is expected be at risk for dengue transmission[11]. To date, an estimated 2.5 billion people are at risk of dengue globally, more than 70% of whom reside in countries in the Asia Pacific region[12].

In Malaysia, a total of 33 684 people were infected with dengue viruses in 2009[12]. As of October 2010, there have been 40 152 cases and 118 deaths in Malaysia[12]. In this country, Ae. aegypti was first found during the 20th century in coastal towns[13]. By 1920, it had already moved inland[14] and has been considered to be main vector of dengue since the early 1950s[7]. Suspected dengue transmission by Ae. albopictus was first reported in 1958 by Smith, who also reported that this mosquito was breeding in forest canopies. Ae. albopictus is now known to breed inside homes on Penang Island, where Ae. aegypti is also present[15].

Measures to control the spread of dengue and related diseases are dependent on how well vector management programs can target the areas where the vectors breed and develop. The main vector, Ae. aegypti, is highly anthropophilic[16] and prefers to feed during the day and to rest inside houses. Female Ae. aegypti shows a preference for laying their eggs in domestic containers[17], but may also use rainwater-accumulating containers present in peri-domestic environments[18,19]. This ability to utilize many containers near human dwelling areas combined with its