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Preliminary field experiments on exophagy of *Aedes albopictus*  
(Diptera: Culicidae) in peridomestic habitat

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**Abstract:** Preliminary field experiments were conducted to examine the exophagy of *Aedes albopictus* in peridomestic habitat by using three different types of experimental buildings in Nagasaki, Japan and Chiangmai, Thailand. The density of females collected by suction traps enhanced by CO<sub>2</sub> was high inside net-walled buildings and at outdoor sites with vegetation. On the other hand, the densities inside a normal walled building and at outdoor sites without vegetation, the microclimate conditions of both of which were different from the outdoor sites with vegetation, were low. To evaluate the effect of blocking by walls for *Ae. albopictus* invading to feed, an additional experiment by using a bamboo hut with openings of different sizes in the walls was conducted in Thailand. As the opening in the walls was smaller, the difference in the number of females between inside and outside of the hut became significantly larger. Therefore, the effect of physical blocking by walls was suggested. We proposed the presence of vegetation, the difference in environmental conditions inside buildings from those in vegetation due to blocking, and physical blocking by walls for invasion as ecological factors influencing the exophagy of *Ae. albopictus*.

#### Introduction

*Aedes albopictus*, known as a dengue vector mosquito, is an exophagous (Hawley, 1988; Rodhain and Rosen, 1997). Precise evaluation on the exophagy or endophagy of vector mosquitoes is important to understand the local pattern of disease transmission, and many studies have been done on the sites of contact between man and the vectors, especially malaria vectors (Gillies, 1988; Ribeiro and Janz, 1990; Ribeiro 1996).

As to the site of blood-feeding of *Ae. albopictus*, previous studies showed that biting density outdoors was always higher than indoors. However, the differ-

ence in densities between outdoors and indoors varied from locality to locality (Rozeboom and Cabrera, 1964; Gould et al., 1968, 1970; Lambrecht, 1971; Hawley, 1988). Even in the same population, the ratio of outdoor density to indoor density showed diel changes (Higa et al., 2000). Several studies showed that spatial variation of female density in natural populations was the result of mosquito response to heterogeneity of the environment constituted by multiple components, such as structural factors (vegetation, rock, soils and buildings, etc.), microclimate conditions and some other factors in habitats (Begon et al., 1996; Beier et al., 1982; Chan, 1985; Niebylski and Craig, 1994; Takagi et al., 1995a, b, c; Higa et al., 2000). There

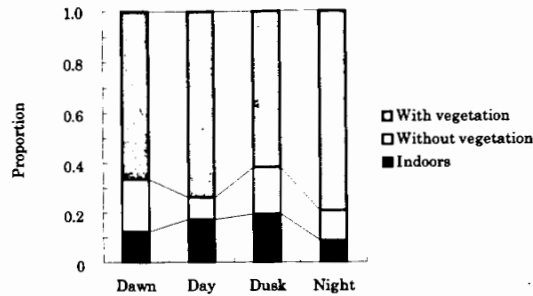


Fig. 3. Proportion of *Ae. albopictus* females collected at different sites from 3 to 12 September 1998 in Nagasaki, Japan.

#### DISCUSSION

Regarding the time of feeding, bimodal activity at dawn and dusk was previously confirmed (Bekku, 1954; Wang, 1962; Ho *et al.*, 1973; Hawley, 1988; Schultz, 1989; Yee and Foster, 1992; Hassan *et al.*, 1996). However, Bekku (1954) and Yee and Foster (1992) who conducted whole-day observation found high feeding activity of *Ae. albopictus* even in the nighttime. We also successfully reconfirmed nighttime feeding activity of the species in vegetation in the present study. Recently, *Ae. albopictus* has been proved to be an opportunistic feeder who got a blood meal from a wide variety of animals such as small mammals, birds and reptiles (Savage *et al.*, 1993; Niebylski *et al.*, 1994). Our results supported their conclusion from the viewpoint that the species is likely to feed on those animals resting in vegetation in the nighttime. It has been found that a local population of *Ae. albopictus* has been successfully maintained for a long period on a remote island without inhabitants (Tsuda *et al.*, personal communication). The feeding activity at nighttime should allow *Ae. albopictus* to feed on a wider variety of animals in a forest in the remote island. More contact with wild animals would increase the risk of transmitting zoonosis to humans.

At dawn and dusk, when the feeding

activity is the highest, females tend to exit from vegetation, and invade into sites without vegetation and indoors. This movement is possibly attributed to degrading of physical conditions such as temperature, relative humidity and light intensity between sites with vegetation and without vegetation.

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#### 摘 要

長崎県における家屋周辺環境下でのヒトスジシマカの吸血活動性と密度の変化に関する研究

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1998年9月、長崎大学熱帯医学研究所敷地内で家屋周辺の茂み及び裸地においてヒトスジシマカの24時間採集を行い、周辺環境の異なる採集場所における吸血活動性と密度のちがいを調べた。ヒトスジシマカの密度は茂みが高く、屋内や裸地で低かった。吸血活動は薄明薄暮に高まり、夜も高かった。最も活動性が高い薄暮には、統計的な有意差はみられないが、昼間や夜間に比べて屋内や裸地で採集される雌個体の割合が高かった。以上の結果からヒトスジシマカの生態における夜間の吸血活動の重要性と薄明薄暮には茂み以外に裸地や屋内などでも吸血される機会が増加することが示唆された。