

# 琉球大学学術リポジトリ

[原著] Seasonal prevalence of *Aedes aegypti* (L.) and *Aedes albopictus* (Skuse) in Sulawesi, Indonesia

メタデータ	言語: 出版者: 琉球医学会 公開日: 2010-07-02 キーワード (Ja): キーワード (En): dengue vector mosquitoes, Aedes, ovitrap, rainfall, Indonesia 作成者: Ishak, Hasanuddin, Toma, Takako, Miyagi, Ichiro メールアドレス: 所属:
URL	<a href="http://hdl.handle.net/20.500.12000/0002016061">http://hdl.handle.net/20.500.12000/0002016061</a>

## Seasonal prevalence of *Aedes aegypti* (L.) and *Aedes albopictus* (Skuse) in Sulawesi, Indonesia

Hasanuddin Ishak\*, Takako Toma\* and Ichiro Miyagi\*\*\*

\*Department of Medical Zoology, School of Health Sciences;

\*\*Research Centre of Comprehensive Medicine, Faculty of Medicine, University of the Ryukyus, Okinawa 903-01 Japan

(Received on July 15, 1997, accepted on September 16, 1997)

### ABSTRACT

The dengue vector mosquitoes, *Aedes aegypti* (L.) and *Aedes albopictus* (Skuse), were collected throughout the year (March 1995-1996) by using ovitraps in and around houses in Ujungpandang and Barru, South Sulawesi, Indonesia. The number of *Aedes* mosquito eggs, particularly in outdoor ovitraps, increased at the onset of the rainy season (November) in Barru, but increased in mid rainy season (January) in Ujungpandang. In the dry season (June-October), the number of eggs decreased in Barru, but not in Ujungpandang. *Aedes aegypti* was dominant in indoor ovitraps in Barru in the dry season, while *Ae. albopictus* was dominant in both indoor and outdoor ovitraps throughout the year in Ujungpandang. *Ryukyu Med. J.*, 17(3)131~134, 1997

Key words: dengue vector mosquitoes, *Aedes*, ovitrap, rainfall, Indonesia

### INTRODUCTION

*Aedes aegypti* is the principal vector of dengue hemorrhagic fever (DHF) while *Ae. albopictus* is an important vector of the disease in Southeast Asian countries<sup>1-4</sup>. Ishak *et al.*<sup>5</sup> studied the breeding habitats of the vector mosquitoes of dengue in Barru, South Sulawesi and reported that *Ae. aegypti* is a dominant species, being abundant indoors especially in the coastal areas. A high Breteau index of this species suggests that it may play an important role in the transmission of DHF in Barru.

Seasonal fluctuations of *Ae. aegypti* and *Ae. albopictus* are closely related to rainfall in Southeast Asia<sup>2,6-8</sup>. Dengue hemorrhagic fever cases in Indonesia increased markedly during the rainy season<sup>3</sup>. To effect appropriate control of dengue vectors, *Ae. aegypti* and *Ae. albopictus*, detailed information on their seasonal prevalence in each locality is important. Therefore in this study, seasonal prevalences of *Ae. aegypti* and *Ae. albopictus* were investigated in South Sulawesi.

### MATERIALS AND METHODS

*Aedes* (*Stegomyia*) mosquito eggs were collected by ovitraps distributed indoors and outdoors in Ujungpandang throughout the year from March 1995 to March 1996, and in Barru, South Sulawesi, from April 1995 to February 1996. The egg collection was made 3 times a month except in

Barru where it was made once in October and two times from November 1995 to February 1996. Barru is located about 102km north of Ujungpandang, the capital of South Sulawesi. Two houses in the housing complex of Baraya in Ujungpandang, one house of Tanete Rilau Health Center and one house of an inhabitant in Barru were selected as study sites. Three indoor and three outdoor ovitraps were placed in each house. Plastic container (12cm in diameter and 5cm in height) was used as ovitrap. It was covered outside by black plastic sheet and light-brown paper towel was rolled inside the container for oviposition. The traps with the paper were half filled with tap-water and both the paper and water in the trap were replaced 3 times a month with new ones. Each paper was dried naturally, packed in a separate plastic bag and airmailed to the Department of Medical Zoology, University of the Ryukyus.

The number of unhatched *Aedes* mosquito eggs on the paper from each ovitrap was counted under stereomicroscope. The eggs were submerged immediately into a container with water and placed in the insectary with constant temperature, 25°C, 80% RH and a photoperiod of 16 hr light and 8hr dark. The hatched larvae were counted and identified when they reached to the 3rd- or 4th-instar or adult, based on morphological character using the keys by Toma and Miyagi<sup>9</sup> and Huang<sup>10,11</sup>. The unhatched eggs after submerging for 10 days<sup>12</sup> were dissected under a stereomicroscope and examined for embryonation.

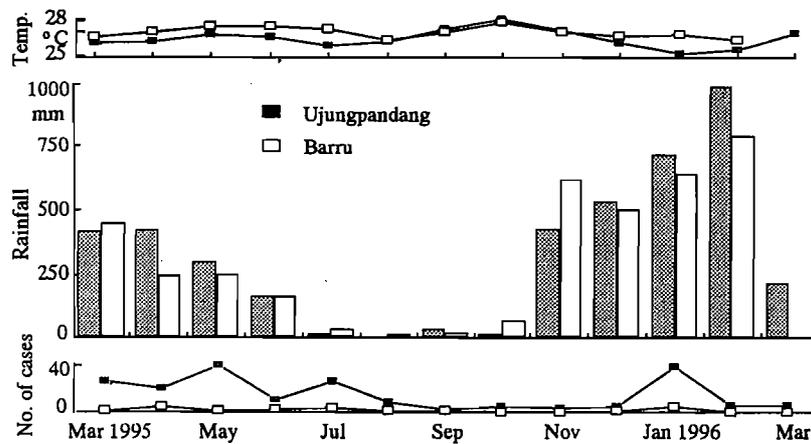


Fig. 1 Monthly mean temperature, total rainfall and dengue hemorrhagic fever cases in Ujungpandang and Barru, South Sulawesi.

Source: Meteorology Station of Ujungpandang and Barru and Health Office of South Sulawesi

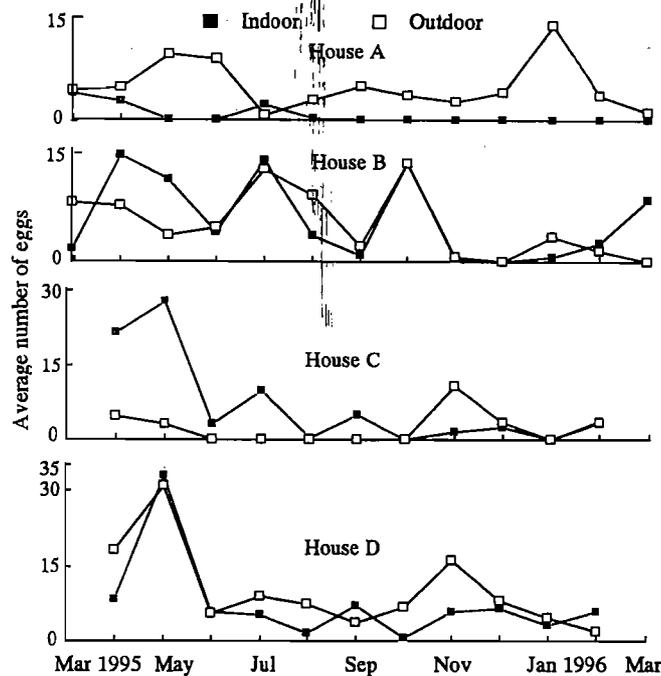


Fig. 2 Monthly average number of eggs of *Aedes (Stegomyia)* species collected in indoor and outdoor ovitraps from Ujungpandang (House A, B) and Barru (House C, D).

The data on monthly rainfall and temperature were obtained from the Meteorology Station in Ujungpandang and Barru, Indonesia. The monthly mean air temperature in South Sulawesi was relatively constant (26.5 to 27.0°C) throughout the year (Fig. 1). The rainfalls were very low from June to October, but high from November to March, with April and May forming the transition period.

## RESULTS AND DISCUSSION

The seasonal pattern of *Aedes* egg populations in

the ovitraps of Barru, South Sulawesi was generally related to that of the rainfall (Fig. 2) as was also the case in Southeast Asian countries<sup>7-9</sup>. The egg populations in both indoor and outdoor ovitraps became low during the dry season from June to October. The population in outdoor ovitraps increased in November with onset of the rainy season. High population was observed in the transition period of April and May. In Ujungpandang, seasonal pattern of *Aedes* egg population was not clear; peaks were often observed in July and October. It might be influenced by the environmental conditions around the ovitraps, as many breeding containers

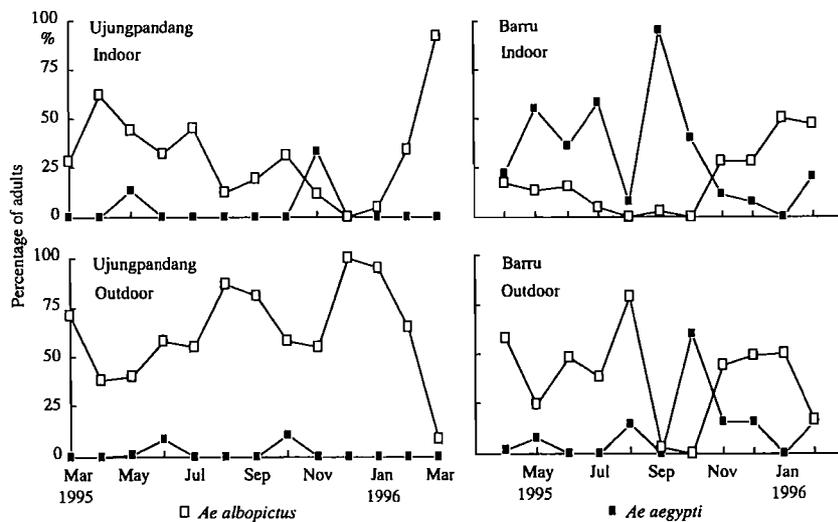


Fig. 3 Percentage of *Ae. aegypti* and *Ae. albopictus* adults reared from eggs laid in ovitraps of Ujungpandang and Barru, South Sulawesi, Indonesia.

of mosquitoes were distributed. A decrease in the population from December to March in the rainy season might be due to some biological factors such as predators, snails that fed on mosquito eggs in the oviposition traps.

The overall hatching rate of the eggs was 48.6% (2257/4645). The respective hatching rates of the eggs from Ujungpandang and Barru were 50.7% (250/493) and 53.4% (721/1349) in the transition period, but the rates were different in the dry season; 54.8% (513/936) and 41.0% (261/636), and in the rainy season; 54.7% (312/570) and 30.3% (200/661). The hatching rates of dry/indoor (45.3%; 324/715) and dry/outdoor (52.5%; 450/857) eggs were not so different, but those of rainy/indoor (49.4%; 205/415) and rainy outdoor (37.7%; 307/815) eggs were different.

All the adults reared from 2257 eggs were *Ae. aegypti* or *Ae. albopictus*. *Aedes aegypti* was dominant in indoor samples from Barru throughout the dry season (Fig. 3). *Aedes albopictus* increased in both indoor and outdoor samples during the rainy season in Barru; in Ujungpandang, it also increased during the dry season with only a few *Ae. aegypti* being observed. The abundance of female *Ae. aegypti* has also been reported in dry periods<sup>13)</sup>.

*Aedes aegypti* is usually dominant in urban areas and indoors<sup>1,8,14)</sup>. In this study, the egg population of this species was low in indoor urban Ujungpandang. This may be related to the houses using screens on the windows and doors.

#### ACKNOWLEDGEMENTS

This survey was supported by grant-in-aid for Monbusho International Scientific Research Program: Field Research (Grant No. 03041065, 06041090).

We thank Dr. Haryanda and his staff, Tanete Rilau Health Center, Barru, Mrs. Rialid and Ms. Hikmawati for their help in the field work. We are also grateful to Prof. Yong Hoi Sen, University of Malaya who kindly checked the original manuscript.

#### REFERENCES

- 1) Chan K.L., Chan Y.C. and Ho B.C.: *Aedes aegypti* (L.) and *Aedes albopictus* (Skuse) in Singapore City. I. Distribution and density. Bull. W.H.O. 44: 617-627, 1971.
- 2) Schultz G.W.: Seasonal abundance of dengue vectors in Manila, Republic of the Philippines. Southeast Asian J. Trop. Med. Pub. Health 24: 369-375, 1993.
- 3) Soedarmo S.P.: The epidemiology, control and prevention of dengue hemorrhagic fever (DHF) in Indonesia. Trop. Med. 35: 161-172, 1993.
- 4) Soekiman S., Machfudz, Subagyo, Adiputro S., Yamanishi H. and Matsumura T.: Comparative studies on the biology of *Aedes aegypti* (Linnaeus, 1762) and *Aedes albopictus* (Skuse, 1895) in a room condition. ICMR Annals 4: 143-152, 1984.
- 5) Ishak H., Toma T., Miyagi I. and Kamimura K.: Breeding habitats of *Ae. aegypti* (L.) and *Ae. albopictus* (Skuse) in villages of Barru, South Sulawesi, Indonesia. Southeast Asian J. Trop. Med. Pub. Health, 1997 (in press).
- 6) Foo L.C., Lim T.W., Lee H.L. and Fang R.: Rainfall, abundance of *Aedes aegypti* and dengue infection in Selangor, Malaysia. Southeast Asian J. Trop. Med. Pub. Health 16: 560-568, 1985.
- 7) Ho B.C., Chan K.L. and Chan Y.C.: *Aedes aegypti* (L.) and *Aedes albopictus* (Skuse) in Singapore City. 3. Population fluctuations. Bull. W.H.O. 44:

- 635-641, 1971.
- 8) Mogi M., Khamboonruang C., Choochote W. and Suwanpanit P.: Ovitrap surveys of dengue vector mosquitoes in Chiang Mai, northern Thailand: Seasonal shifts in relative abundance of *Aedes albopictus* and *Aedes aegypti*. *Med. Vet. Entomol.* 2: 319-324, 1988.
  - 9) Toma T. and Miyagi I.: The mosquito fauna of the Ryukyu Archipelago with identification keys, pupal descriptions and notes on biology, medical importance and distribution. *Mosq. Syst.* 18: 1-109, 1986.
  - 10) Huang Y.M.: Contributions to the mosquito fauna of Southeast Asia. I. The *scutellaris* group of species. *Contr. Am. Entomol. Inst.* 9: 1-109, 1972.
  - 11) Huang Y.M.: Medical entomology studies. XI. The subgenus *Stegomyia* of *Aedes* in the oriental with keys to the species (Diptera: Culicidae). *Contr. Am. Entomol. Inst.* 15 : 1-79, 1979.
  - 12) Hawley W.A.: The biology of *Aedes albopictus*. *J. Am. Mosq. Control Assoc.* 4: 1-40, 1988.
  - 13) Van Peenen P.F.D., Atmosoedjono S., Lien J.C. and Saroso J.S.: Seasonal abundance of adult *Aedes aegypti* in Jakarta, Indonesia. *Mosq. News* 32: 176-179, 1972.
  - 14) Oda T., Igarishi A., Hotta S., Fujita N., Funahara Y., Djakaria S., Hudojo R., Isfarain A. and Djohor D.: Studies on bionomics of *Aedes aegypti* and *Aedes albopictus* and dengue virus isolation in Jakarta, Indonesia. *ICMR annals* 3: 31-38, 1983.