“ยุงกัด, ไม่ดี”

Ecology of Mosquitoes in Thailand

Anna Kim

Outline

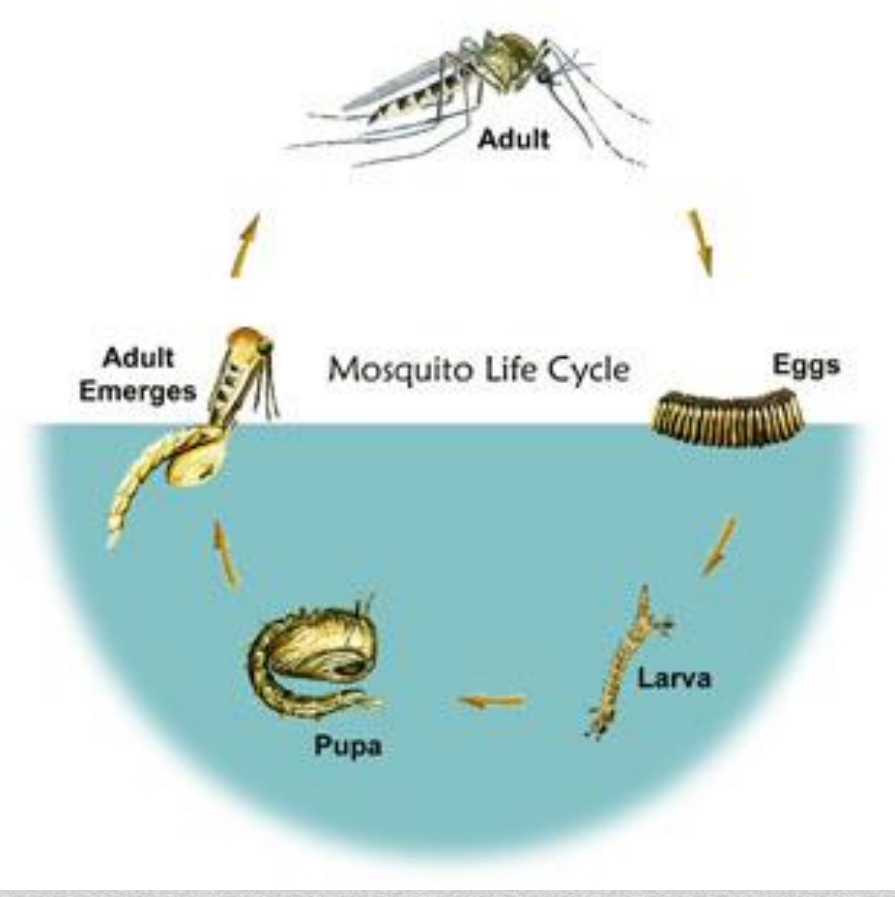
- Introduction: About Thailand
- Population Ecology Principles
  - Life Cycle of Mosquitoes
  - Dispersal of Mosquitoes
  - Species Interactions
- Application
- Take Home Message

Introduction

- Thailand has three distinct seasons
  - Cool dry season—Late November-February (60-80 F)
  - Hot dry season—March-May (Average 86 F)
  - Rainy season—May-October (68-86 F)
- Seasons and temperatures vary between northern, central, and southern Thailand
  - Northern Thailand—Cool dry season lasts until December with nighttime temperatures dropping below freezing
- Northern Thailand's primary commodity is rice (Falvey, 2000)

Life Cycle

- Eggs are laid one at a time and float on the surface of water.
- Larvae
  - Live in the water and come to the surface or have siphon tubes to breathe
  - Eat microorganisms and organic matter
  - Molt four times
- Pupa is the non-feeding stage
- Adult rests on the surface of the water to dry, harden, and spread wings
- Life Cycle of *Culex Tarsalis*
  - at 70 F = 14 days
  - at 80 F = 10 days
- Life cycles range from 4 days to a month



Life-history Strategies

Male Mosquitoes

- Lifespan-about a week
- Flight range usually shorter
- Feed mostly on nectar

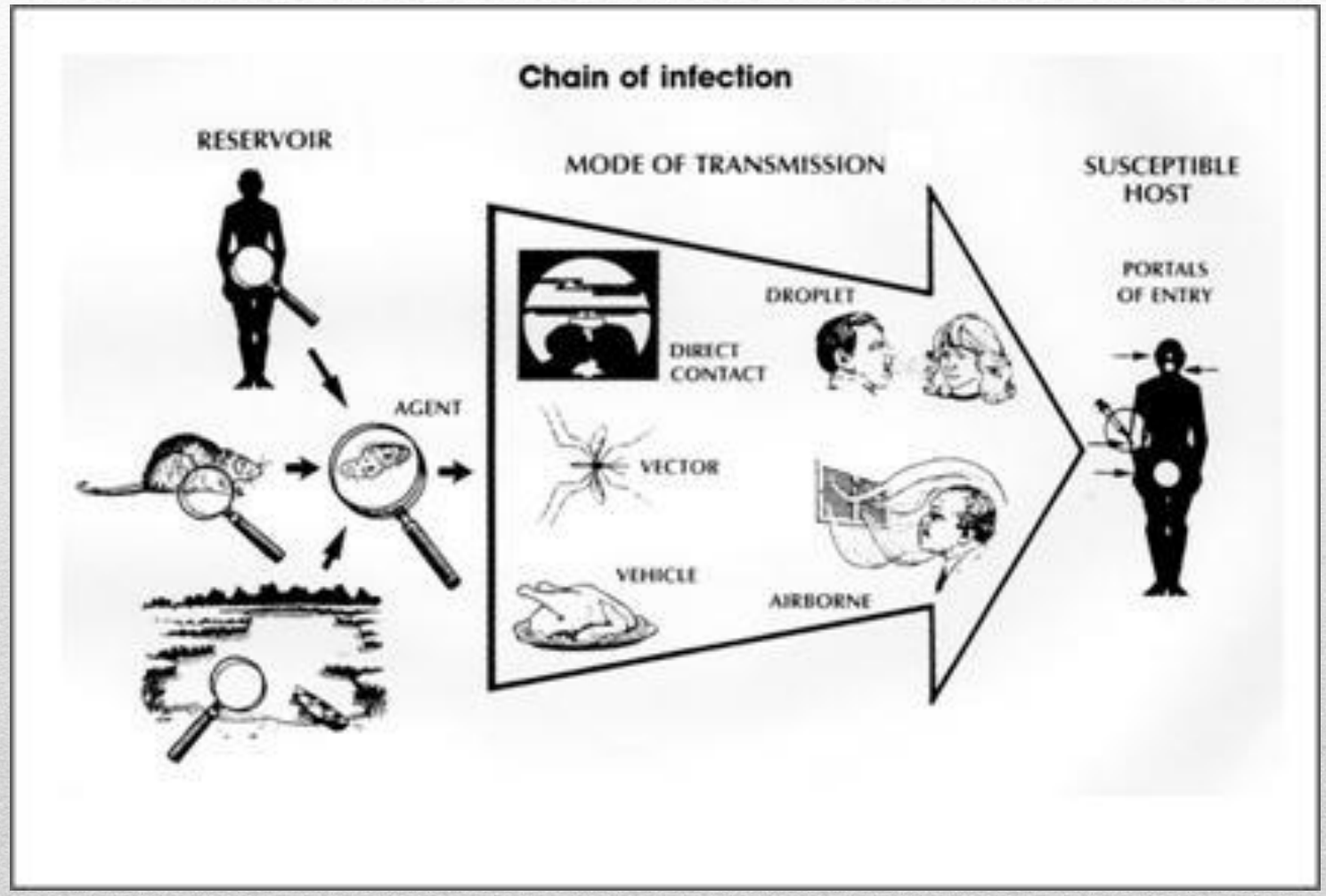
Female Mosquitoes

- Lifespan-about a month
- Flight range usually longer
- Feeding depends on the species
  - Most female mosquitoes that feed on nectar, feed on blood to reproduce

Dispersal

- Mosquitoes (on their own)
  - Flight ranges 1 mile-75 miles from breeding sites
- Rubber and Tires
  - Rubber tappers (Pattanasin, 2012)
  - Rubber Plantations (Satitvipawee, 2012)
- Asian Open-billed Stork (Tiawsirisup, 2010)
- Thai Children School Uniforms

Species Interactions



Application

- Insecticide
- Antiviral Drugs
- Antimalarial Pills

Trans R Soc Trop Med Hyg. 1990 Jan-Feb;84(1):22-8.

Highly efficient dry season transmission of malaria in Thailand.

Rosenberg R, Andre RG, Somchit L.

Department of Entomology, Walter Reed Army Institute of Research, Washington, DC.

Abstract

Man-biting collections were made for 7 consecutive nights per month for 24 months at 2 sites in a Thai village regularly treated with DDT and fenitrothion yet hyperendemic for Plasmodium falciparum and P. vivax. Only Anopheles dirus was incriminated as a vector: 1.6% were infective and 2.4% were infected (median numbers of oocysts = 3.5). Transmission occurred within the village, which was located in groves of rubber and fruit trees during the dry months of November to May only when rates of parity (64%) and biting (2/man-night) were higher than during the monsoon (38% and 0.8%/man-night). Vectorial capacity and inoculation rates surged and then fell during 30 d at the end of the monsoon, quickly reinitiating transmission. Sporozoite species were identified using indirect fluorescent antibody tests or enzyme-linked immunosorbent assays: 76% were P. falciparum, compared to 78% of gametocytes; one mosquito was infected with both species. Vector survival and inoculation rates differed between similar sites 800 m apart. Dry season breeding occurred at the bottom of a deep, concrete-lined well. Much of the natural forest habitat of An. dirus in south-eastern Thailand that was once destroyed for farming is now being replaced with orchards; this ecological change may reintroduce malaria to a wide area.

Take Home Message

POP QUIZ

Pop Quiz

- How many seasons does Thailand have?
- Life Cycle of Mosquitoes
  - What are the minimum requirements mosquitoes must meet to successfully reproduce?
  - What are the four stages of a Mosquito?
- Dispersal of Mosquitoes
  - Is this an opened or closed population?
- Species Interactions
  - The mosquito is an example of which mode of transmission?

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