

**Pest Awareness Program  
Happy & Pest Free Toilet Seminar- 21<sup>st</sup>  
March 2011**



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Managing Director  
Rentokil Initial (S) Pte. Ltd.**



- **Imagine yourself at bar with some of your friends. Everybody is having a good time. Suddenly your friend stands up and ask you to go washroom with them....**

## Man Response?



## Woman Response?



# Washroom facts & figures in Singapore



DID YOU  
**KNOW**



30,000

Public washrooms in Singapore

892,400

HDB flats in Singapore

107,780

Condominium units in Singapore

70,320

Landed properties in Singapore

87,750

Commercial units in Singapore



**Estimate 2,925,625**  
washrooms in Singapore!!

On an average, we spent the following amount of time in a washroom

30 minutes

A day

3.5 hours

A week

182 hours or 8days

A year

680 days

A lifetime



**Close to 2 years of our lives!**

**Hence Washroom can be a potential place for pest breeding**



**Pests are living organisms which are detrimental to humans in some way.**

- 1. ...living organisms ( can reproduce)**
- 2. ...detrimental to humans in some way**
  - physical harm ( cause infection )**
  - financial harm ( loss of goodwill)**
  - psychological harm ( no peace of mind )**



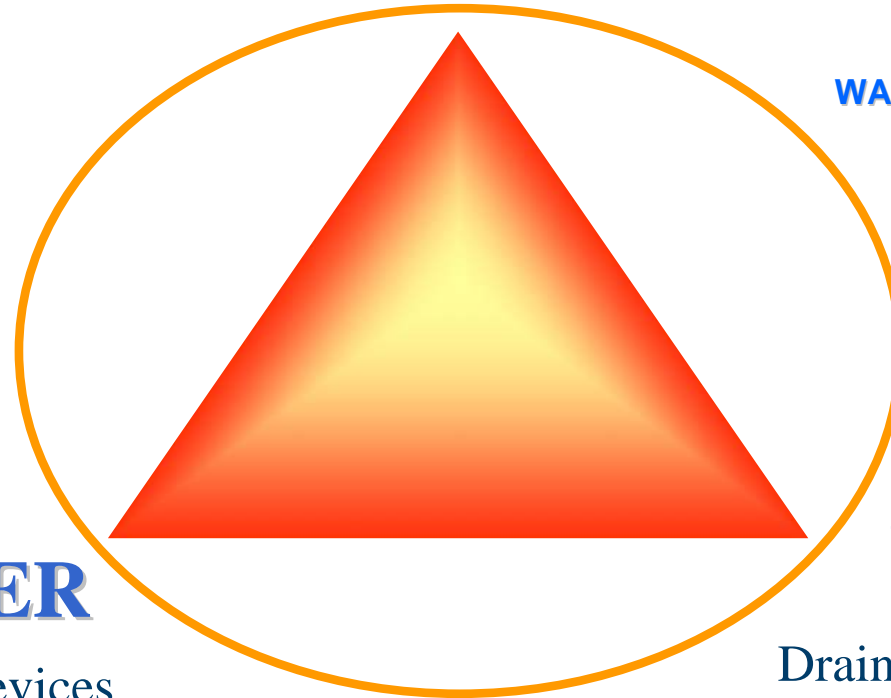
# Conditions favorable for PEST to survive



## FOOD

Accumulated Food and Debris

WARMTH



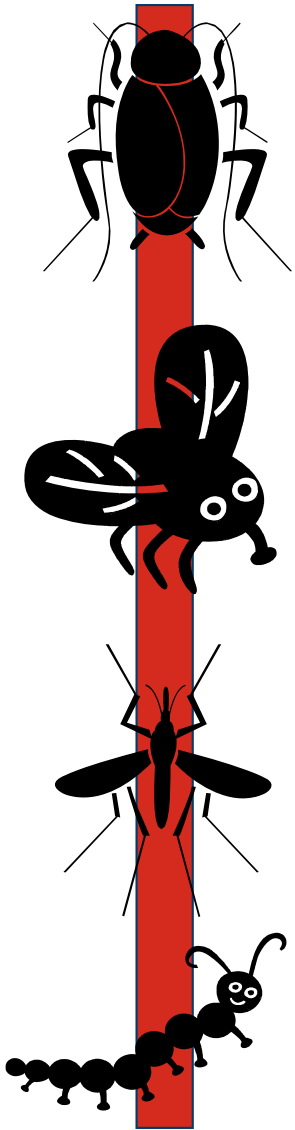
## SHELTER

In Crack & Crevices

## WATER

Drainage / Water leakage

# Pests Risk Map



Pests  
Risk  
Map



## Scientific Taxonomy

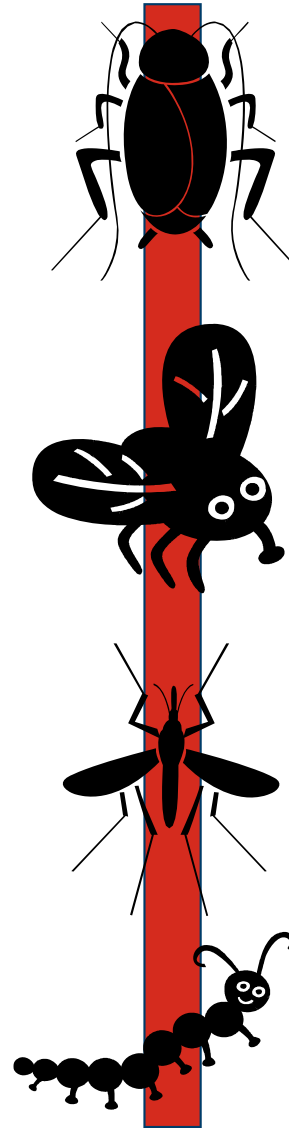
**Kingdom** : Animalia



**Phylum** : Arthropoda

**Class** : Insecta

**Class** : Diplopoda



### Order : Blattaria

- American Cockroach
- German Cockroach

### Order : Diptera

- Phorid Fly
- Moth Fly
- Aedes sp.

### Millipedes

- Various

Pests  
Risk  
Map



**Habit: Mostly terrestrial , few aquatic.**

**Body Region: Head, Thorax, Abdomen**

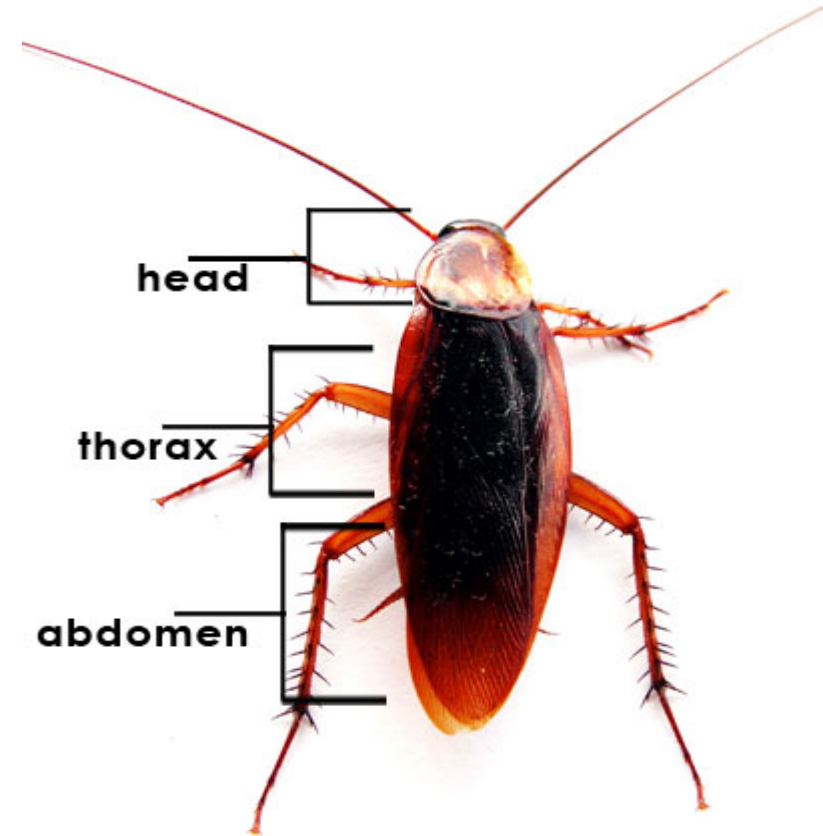
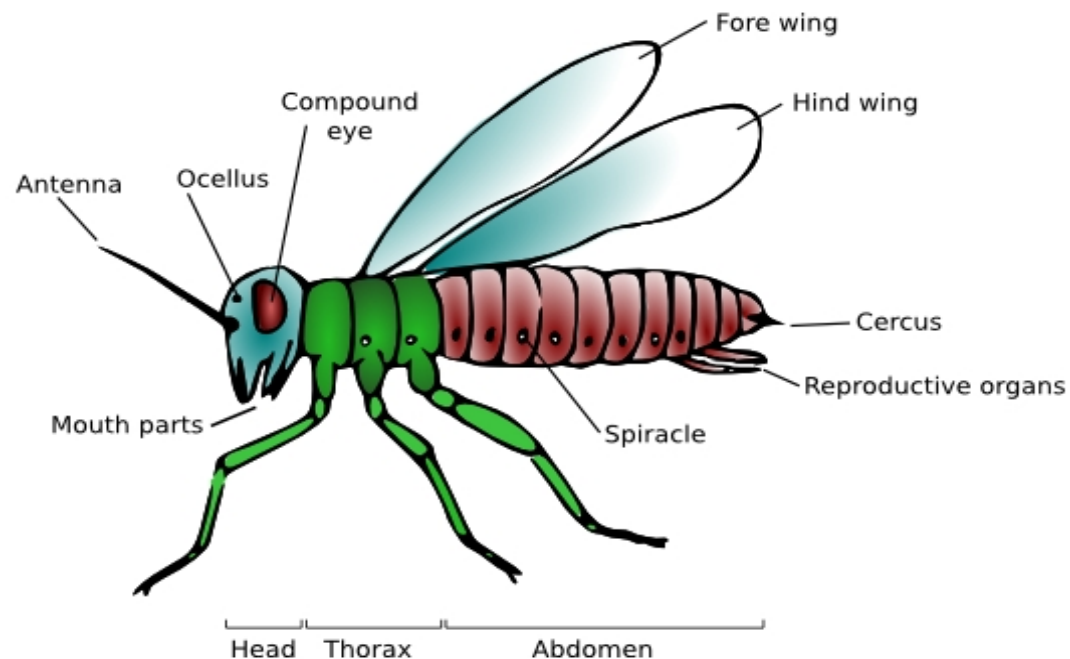
**One pair Antennae & Compound eyes.**

**3 pair of legs & 2 pair of wings.**



## BODY REGIONS:

- **HEAD** – antenna / compound eyes
- **THORAX** – 3 pairs of legs / 2 pairs of wings
- **ABDOMEN**

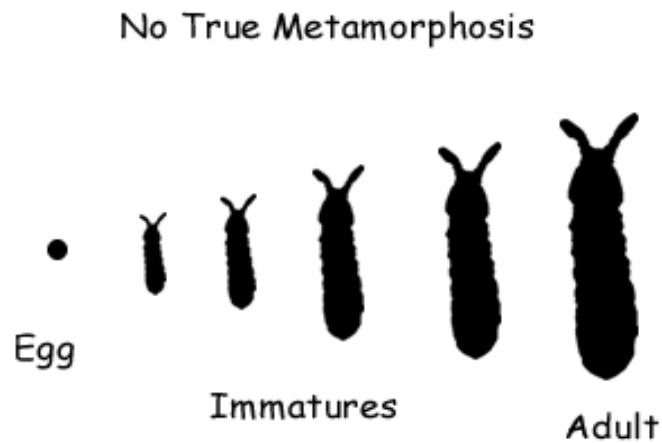


# Metamorphosis

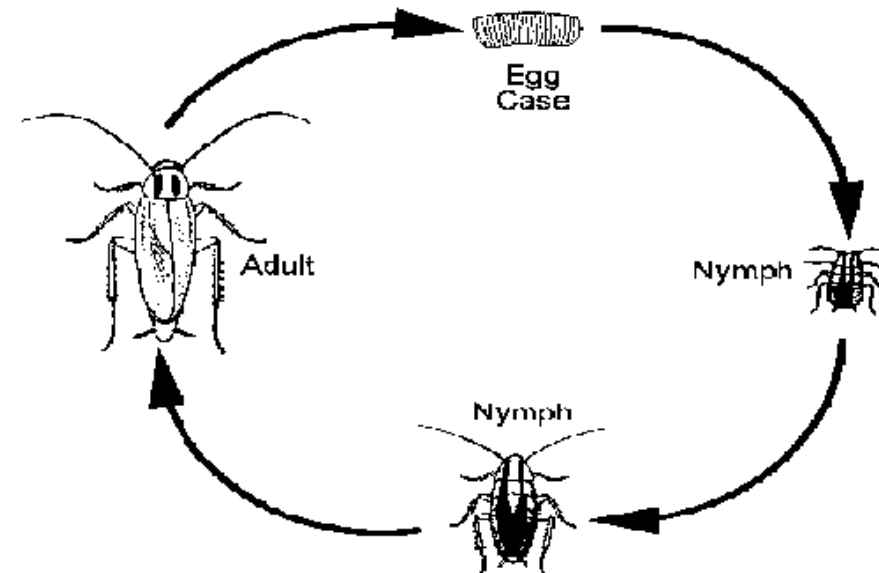


Metamorphosis is the change in growth and development an insect undergoes during its life cycle from birth to maturity .

## 1. No metamorphosis/ Ametabola e.g. *Silverfish*



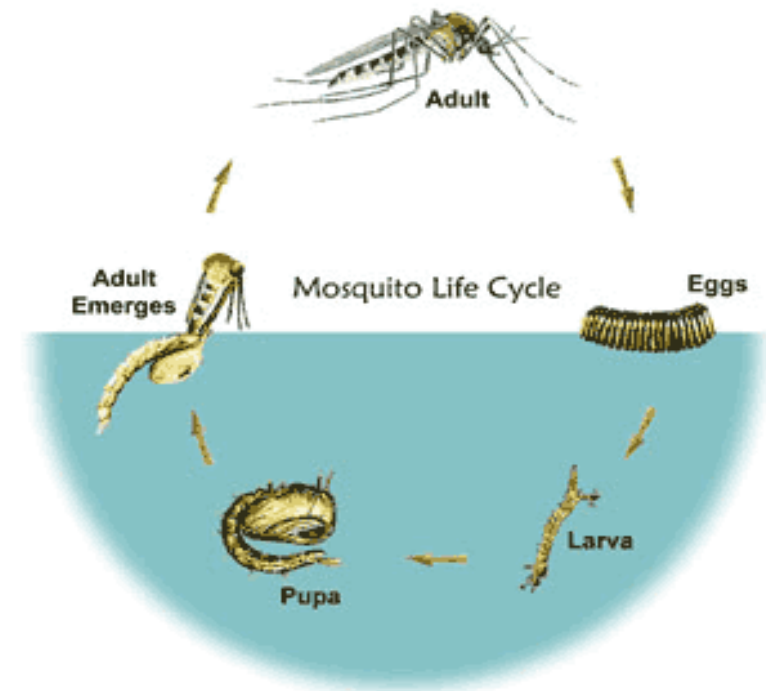
## 2. Gradual metamorphosis/ Paurometabola e.g. *Cockroach*



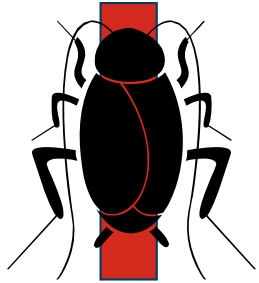
### 3. Incomplete metamorphosis/ Hemimetabola e.g. *Dragonfly*



### 4. Complete metamorphosis/ Holometabola e.g. *Mosquito*



# Cockroaches



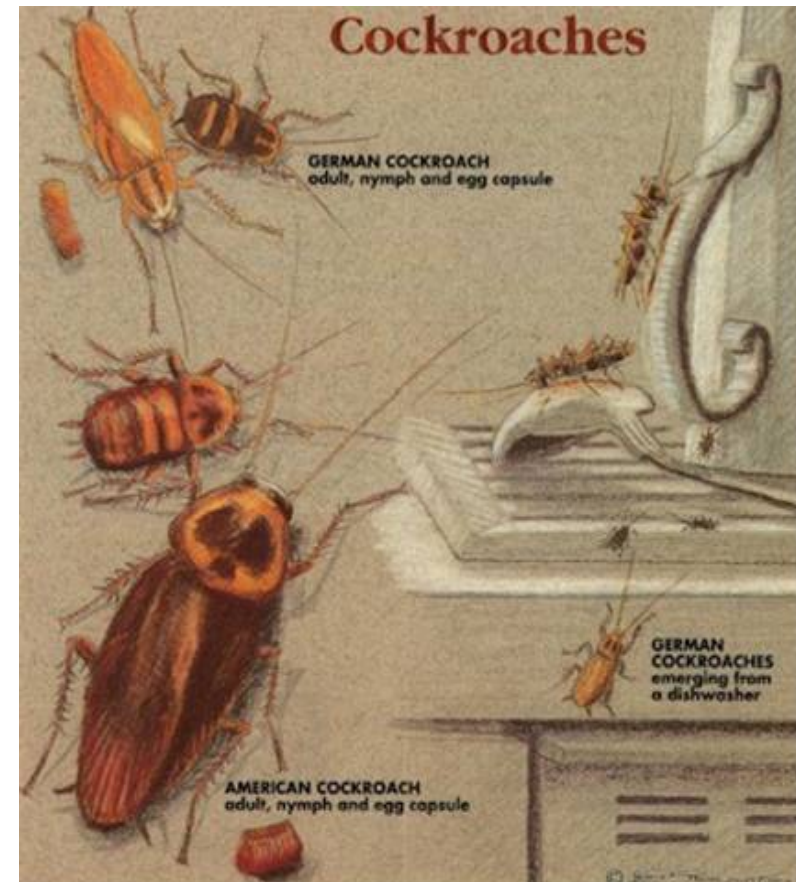
Pests  
Risk  
Map

# Cockroaches Spread Disease



Roaches carry disease-causing bacteria on their bodies, legs, foot pads, and within their guts.

By moving from an infected source e.g. drain, sewer, direct into human food , or on to food preparation surfaces e.g. tables, this insect introduces bacteria into the victim's body. This causes illness & disease.





## About Cockroaches, Other Pests and Asthma



Droppings or body parts of cockroaches and other pests can trigger asthma. Certain proteins, called allergens, are found in cockroach feces and saliva and can cause allergic reactions, or trigger asthma symptoms, in some individuals. Cockroaches are commonly found in crowded cities and the southern regions of the United States. Cockroach allergens likely play a significant role in asthma in many inner-city areas.

Source:





Amongst the diseases spread by cockroaches, Food Poisoning attracts the most attention. It is a common experience of many.

Food Poisoning can be caused by many types of disease-causing bacteria. Amongst them, the important ones are:-

- *Escherichia coli* (*E. coli*)
- *Salmonella typhimurium* (*S. typhimurium*)



## Four most common pest cockroaches:

- *Blattella germanica* (German cockroaches)
- *Periplaneta americana* (American cockroaches)
- *Periplaneta brunnea* (Brown cockroaches)
- *Supella longipalpa* (Brown-banded cockroaches)

**German Cockroach** Hotels & Food – Outlets

**American Cockroach** Predominant in Domiciliary

**Brown Cockroaches** Outdoor eg foundation planting

**Brown-banded** Occasionally found in offices & dry warehouse

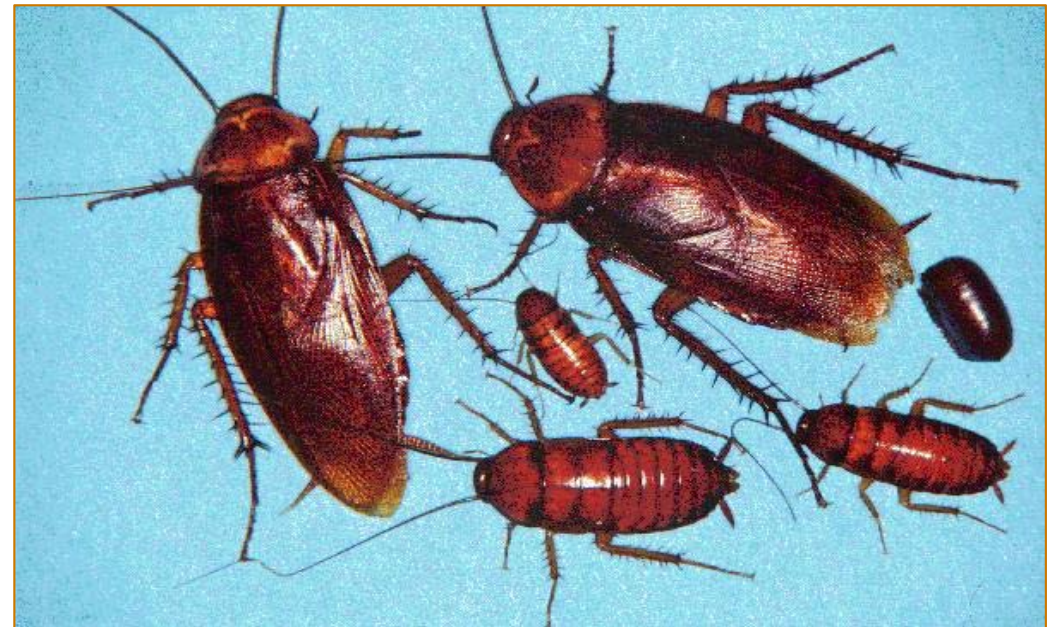


# Common Pest Cockroaches In Toilet

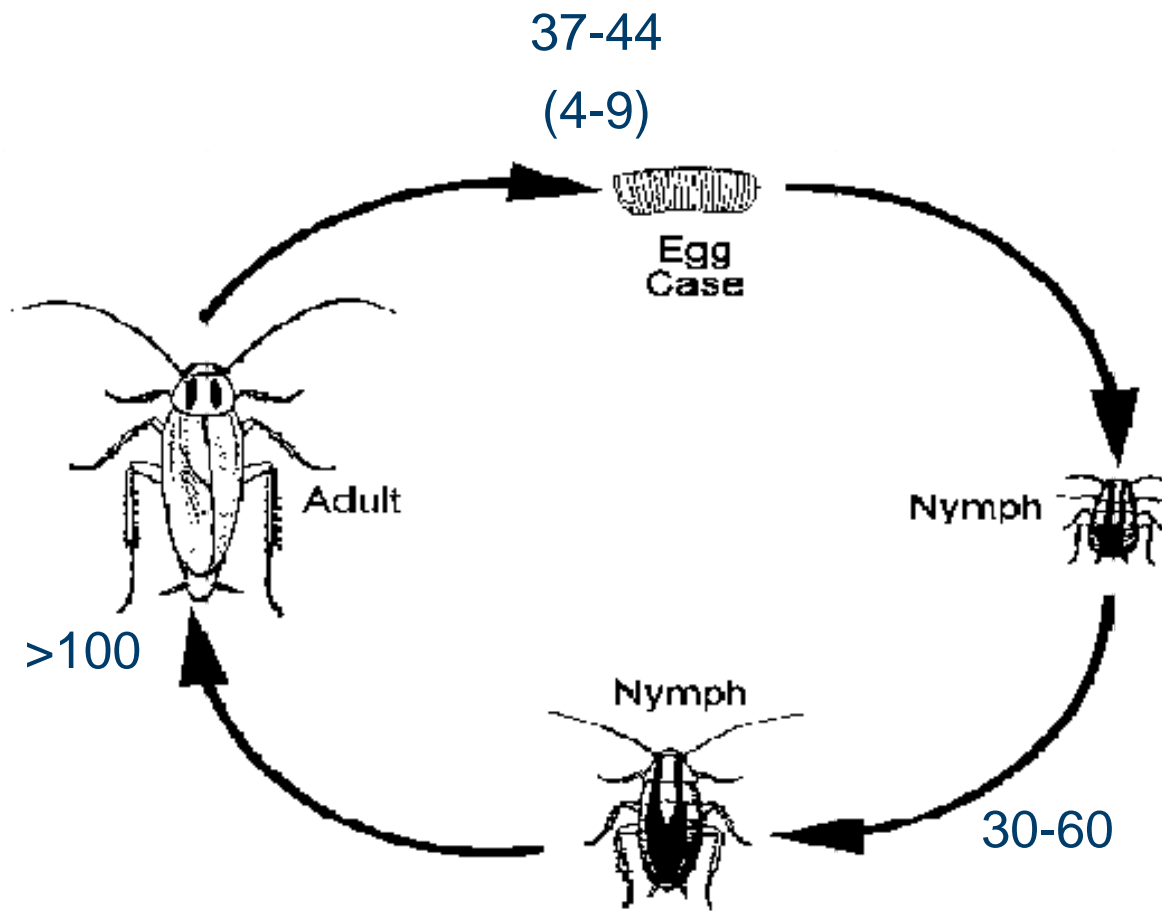


*Blattella germanica*

*Periplaneta americana*



## - Gradual Metamorphosis



**German** Cockroaches

## American Cockroaches

- 14-28
- (10-90)
- 150
- 360

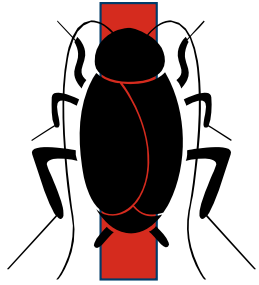


Albino Cockroach...



- ✓ **Signs – smear marks**
- faecal pellets**
- egg cases**
- cast nymphal skins**
- live insects**
- smell**

# Cockroaches



## Usually Found:

- Floor Corner
- Wall
- Sink
- .....

**Sources?**



# Potential Harborage



**Gulley trap / service manhole / bath trap / carried-in**

# Potential Harborage



Attraction / hiding spot

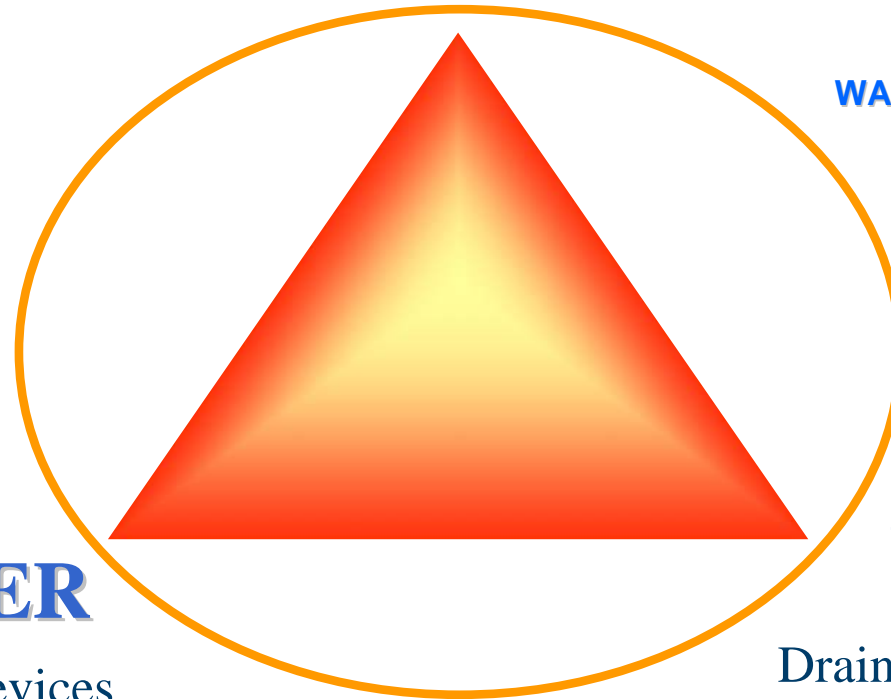




## FOOD

Accumulated Food and Debris

WARMTH



## SHELTER

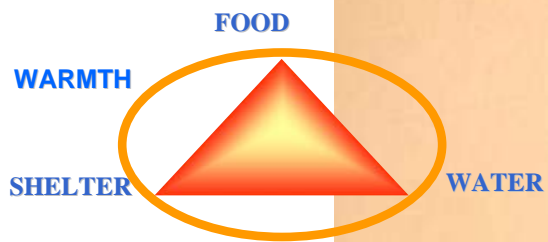
In Crack & Crevices

## WATER

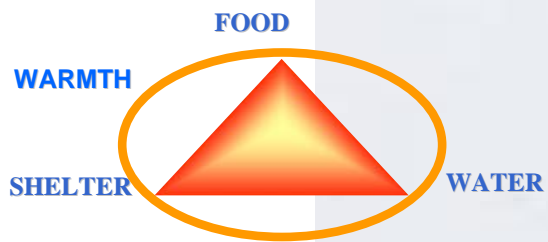
Drainage / Water leakage



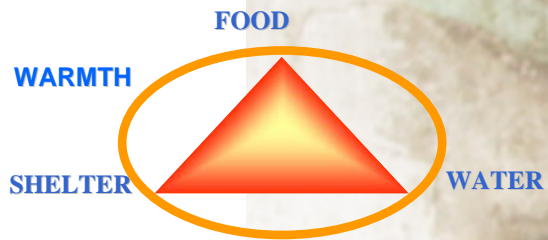
# Exclusion



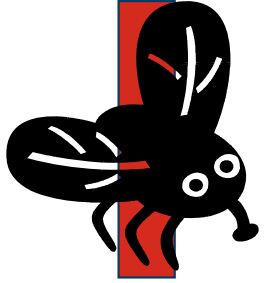
# Exclusion



# Restriction

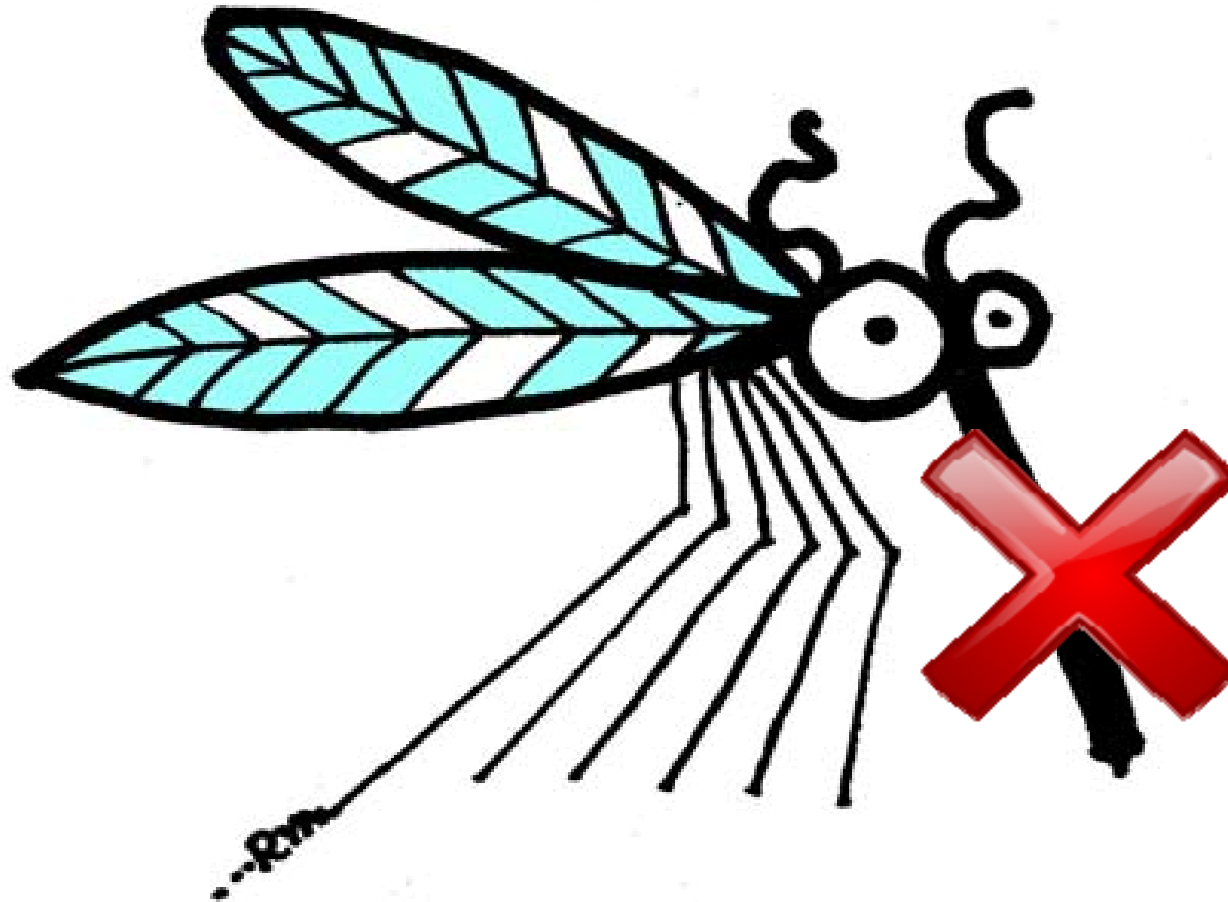


# Flies



Pests  
Risk  
Map

# Non-Biting Mosquitoes In Toilet



Nuisance Mosquitoes

# Bedok Reservoir's big, bad, bug problem



## Midges bug Bedok folk

Residents, shops riled by insect infestation

By Cai Haoxiang

THEY are attracted to clothes hung out to dry, land in food and end up in drinks, cling to walls and ceilings, and a mass of them can black out fluorescent lights.

Millions of these tiny green and black flies have invaded the open areas and homes of residents living in Bedok Reservoir Road.

The flies, or non-biting midges – known scientifically as *Chironomidae* – originated from the macroty ground around Bedok Reservoir and have been infesting residents over the past week.

Complained Madam Vivian Ng, 48, who lives above her hardware shop in Block 740: "My 12-year-old daughter saw the flies in her soup and told me she wanted to vomit."

"They stick on all the clothes I hang out to dry... It's horrible especially when you're eating and insects start falling around you."

The infestation has hit estates especially hard, said Mr Koh Hup Leong, 50, a grassroots leader overseeing the shops in the area. This is because of the proliferation of the insects in the evening hours, coinciding with when most residents are out to shop and eat, and when lights across the estate are switched on, he said.

Said Mrs Maggie Pang, 51, a supervisor at the Super Lucky Restaurant: "Business is down by 30 per cent to 40 per cent. A lot of customers order

their food, see the insects, and then run away."

Other businesses have not been spared. Outside a beauty salon, a thick band of thousands of dead midges lined the shop's glass window.

Responding to the chorus of complaints from residents, Foreign Minister George Yeo, the MP for the Bedok Reservoir-Punggol ward of Aljunied GRC, visited the area yesterday afternoon. Accompanying him were representatives from the Aljunied Town Council, the PUB and the National Environment Agency (NEA).

The town council brought in pest control contractors yesterday morning to spray the banks of the reservoir and the walls of nearby Housing Board blocks with an insecticide.

This will continue every day until the midge infestation is gone.

The insecticide is biodegradable, water-based and causes no health problems, said Mr Nicky Yeong of pest control company Rentokil, which is carrying out the fumigation.

Mr Yeo also visited shops and talked to residents to reassure them that the situation is under control.

"It's more of a nuisance than a danger in any health sense," he said. "But they are uncomfortable, get into your food and can be very irritating."

He said the problem had been around in Bedok in previous years, and resurfaced a few weeks ago. But the insect population explosion of the last few days was unprecedented.

NEA officials told Mr Yeo that this could have been the result of changes to the ecosystem in the area. While they had yet to pinpoint the exact cause, they suggested it may be due to a chemical imbalance, or the rainy season, among other possibilities.

Said Mr Yeo: "We don't really know, so we're going to treat it proactively and hope that when the weather changes, the problems will be resolved."

The midges lay eggs in the reservoir, and the larvae cannot be eaten by fish as they are hidden in the mud, said Mr Martin Nathan, head of the NEA's North East Regional Office, offering another possible reason for the scale of the infestation this time around.

The midge problem had also surfaced recently in Tahan Gardens and Yishun, added NEA senior operations manager Tang Choon Seng.

Mr Yeo said the insect explosion

has attracted large numbers of swiflets to the area to feed on the insects.

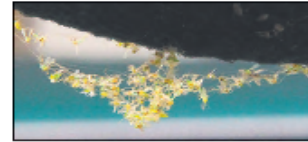
Spiders too, he said, have been "working overtime", spinning webs on ceilings and walls to trap the flies.

To deal with the midge problem, Mr Yeo said, residents could switch off the lights, cover food and not open their windows. Some residents have also found high-frequency insect repellent devices useful.

But Mr Tony Teo, 64, a music instructor living in Baywater condominium, said that although his walls are covered, he is taking the infestation in his stride.

"You can't exterminate them completely, and bug spray doesn't work. Complaining is useless. We just ignore them. After a while, the insects will go away," he said.

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(Top) Non-biting midges trapped in a spider's web. (Above) A resident removing a pile of the insects from the cover of a lighting fixture in his home. PHOTOS: LUNWHE ZHANG



Mr George Yeo (in light blue shirt) watching Rentokil staff spray insecticide on the walls of HDB blocks yesterday.

Non-biting midges, known scientifically as *Chironomidae*.

Date: Jan 19, 2011

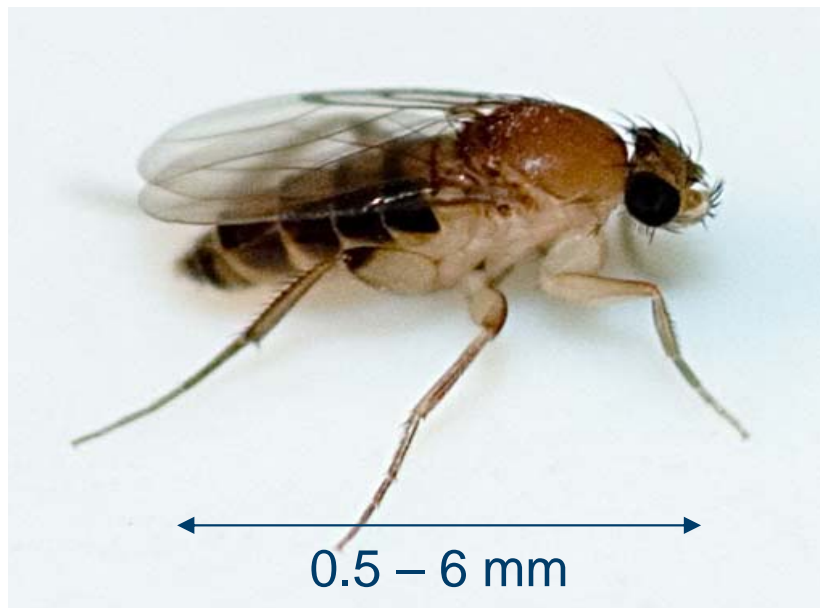
Residents in the area have reported the tiny, green-and-black flies are attracted to hanging clothes, food and drinks and cling to walls and ceilings, and especially to florescent lights.

"My 12-year-old daughter saw the flies in her soup and told me she wanted to vomit".

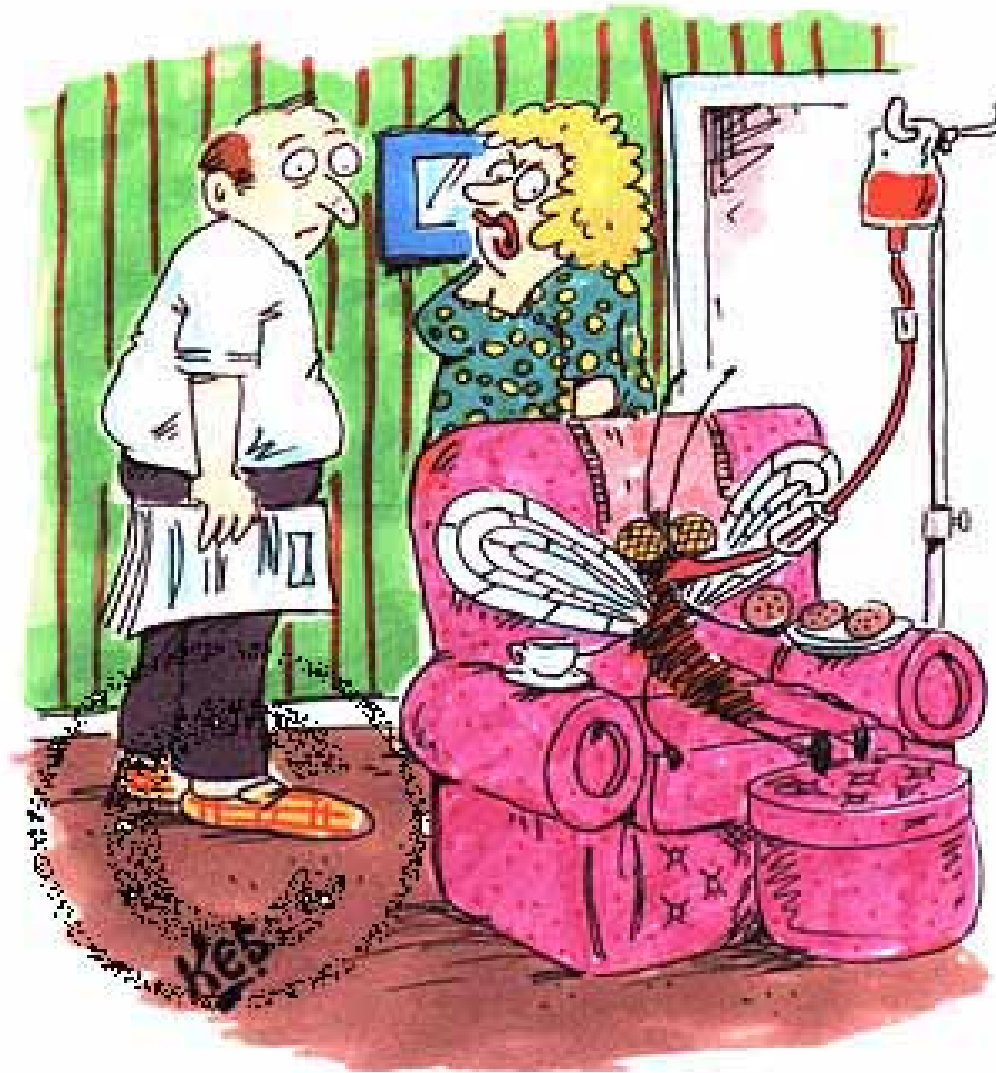
# Small Flies



- ✚ Primarily a nuisance
- ✚ Breeding sources: decomposing moist organic material, kitchen or bathroom
- ✚ Life cycle: 14-37 days (Phorid / Coffin Fly)/ 7- 28 days (Moth/ Drain Fly)



# Biting Mosquitoes In Toilet



"You spoil that mosquito!"



# Biting Mosquitoes In Toilet



Identification based on the surface of thorax of adult mosquito



*Aedes aegypti*

**Renown household breeder and aggressive daytime biter**

# Adult Mosquitoes



## Male



## Female

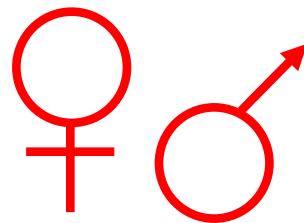


Transmit  
Disease

# Blood Meals



Adults have long proboscis (mouthparts) for piercing and sucking blood



To complete the gonotrophic cycle



**Dengue fever incubation  
4-6 days (range 3-14  
days).**

## SYMPTOM OF DENGUE HAEMORRHAGIC FEVER



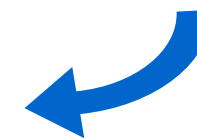
DHF appeared in Singapore in the 1960s and quickly became a major cause of childhood death.

Condition is characterized by plasma leakage as a result of alteration in microvascular permeability.

Egg (2-3 days)



Larva (4-5 days)



Pupa (1-2 days)



Adult (2 weeks)



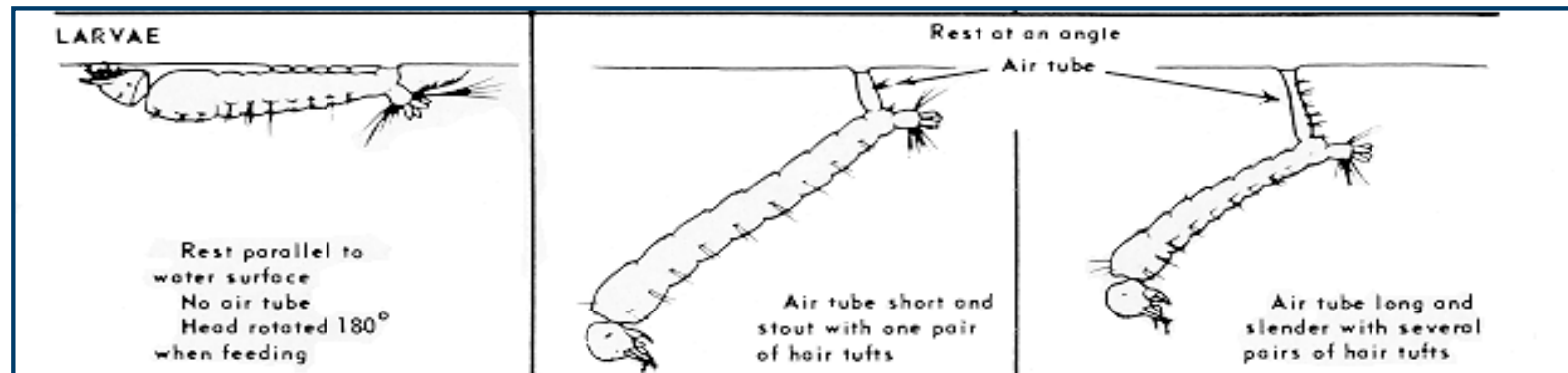
## *Aedes* Life Cycle

Active during the day but peak activity is at dusk and dawn.

- Female lay eggs ~ 3 times in its lifetime, ~100 eggs per batch.
- Under dry conditions eggs can remain dormant for up to about 9 months.

# How to identify them?

## Aedes



## Anopheles

## Culex





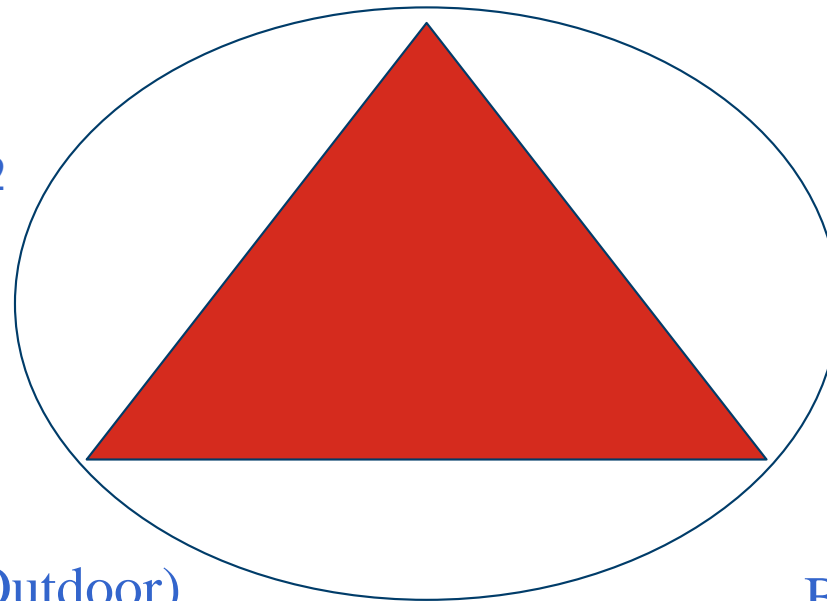
## Food

Human / Animal Blood (Outdoor/Indoor)

Heat / Octenol / CO<sup>2</sup>

## Shelter

Resting Places (Indoor / Outdoor)



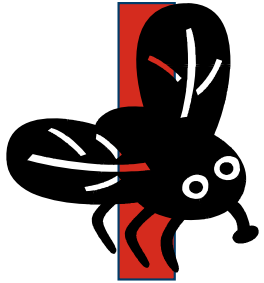
## Water

Breeding Places

(polluted / clean / stagnant)



# Flies



## Usually Found:

- Wall
- Sink
- .....

**Sources?**



Pests  
Risk  
Map

# Hot Spots for Mosquito Breeding



## Containers With Mosquito Breeding

Discarded plastic materials	36%
Refrigerator trays	21%
Tyres	14%
Pet's water container	14%
Household's water container	7%
Base of flower vase	7%

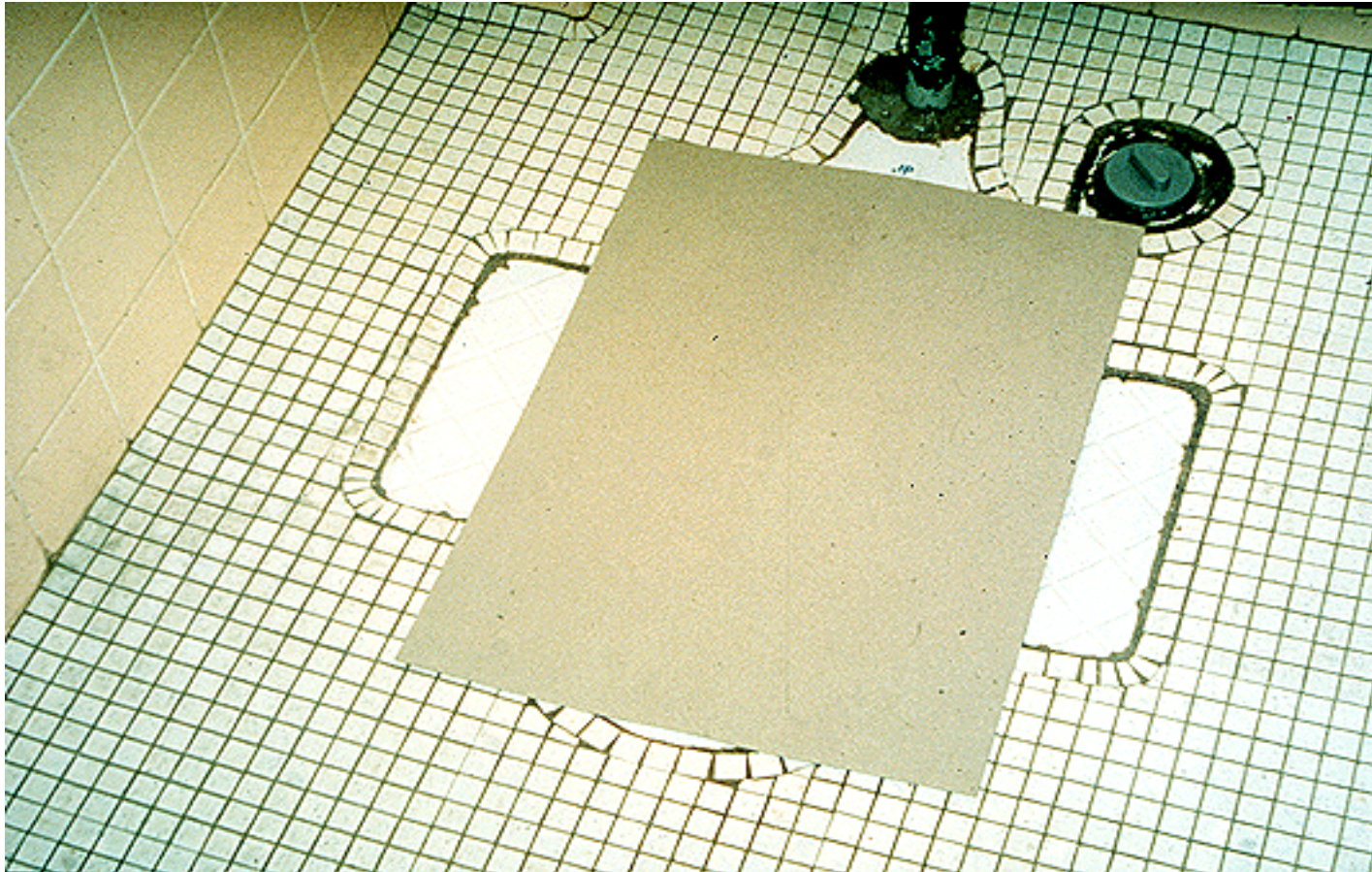
*survey conducted by MOH in 2009, Malaysia*

## Aedes Mosquito Breeding in Schools

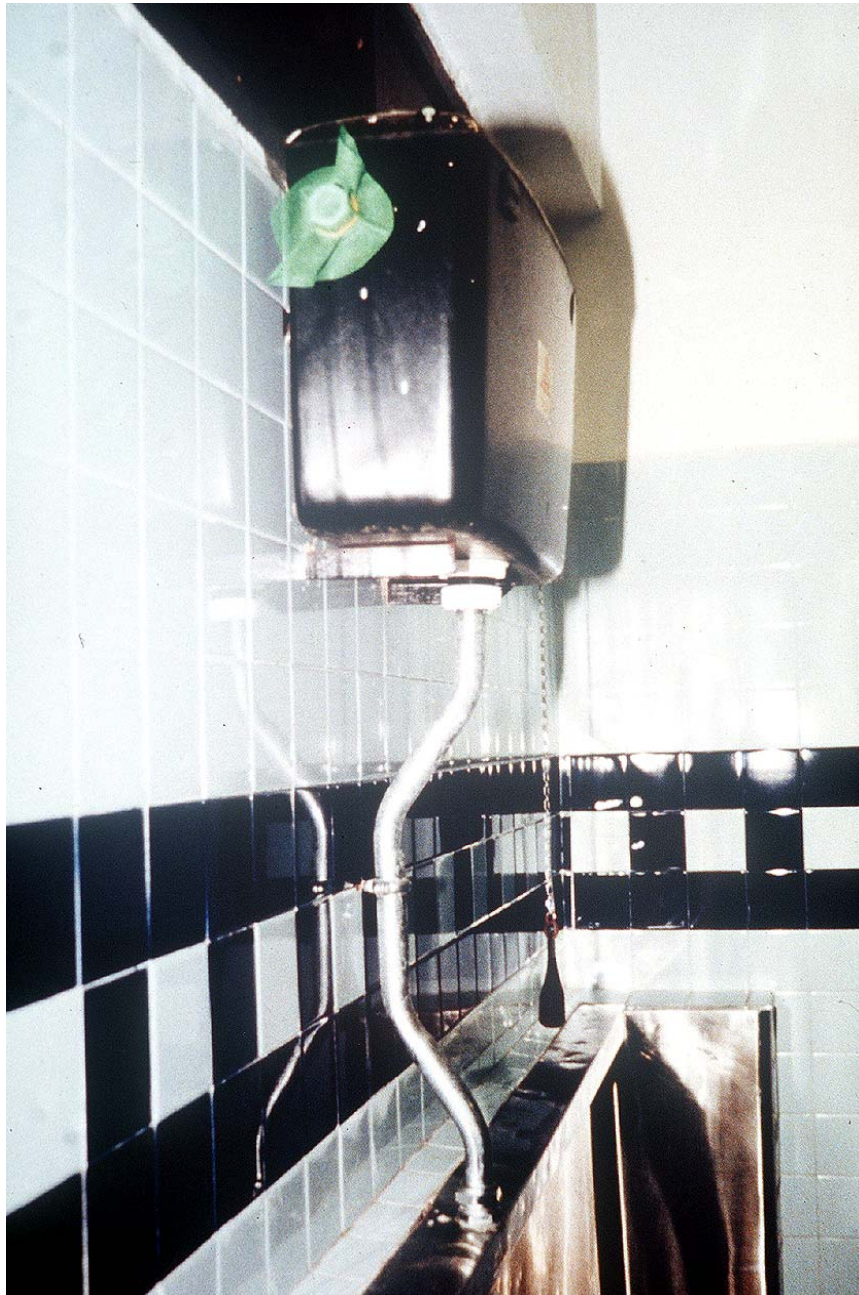
Discarded Receptacles	20%
Domestic Container	15%
Ornamental Containers	13%
Gulley Traps	9%
Canvas Sheet	7%
Others	36%

*survey conducted by NEA in 1997 for 1117 schools*

# Eliminate Breeding Source



# Eliminate Breeding Source



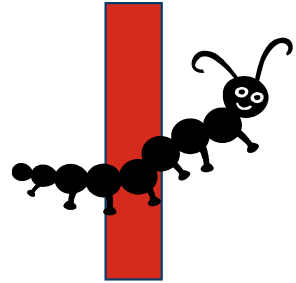
# Eliminate Breeding Source



# Breeding Source



# Millipedes



Pests  
Risk  
Map



- Two pairs of legs per segment.
- Elongated cylindrical bodies
- Slow moving creature
- Eat decaying leaves and other dead plant matter, moisturising the food with secretions

## "millipede"

is a compound word formed from the Latin roots:

*mille* ("thousand")  
*pes* ("foot").



# Millipedes



**Defense mechanisms - inability to bite or sting, primary defense mechanism is to curl into a tight coil**

# Millipedes



Seal  
Crevices



Millipedes often leave their natural habitats at night and crawl about over sidewalks, patios, and foundations. Floor trap is not the primary habitat.

# Millipedes

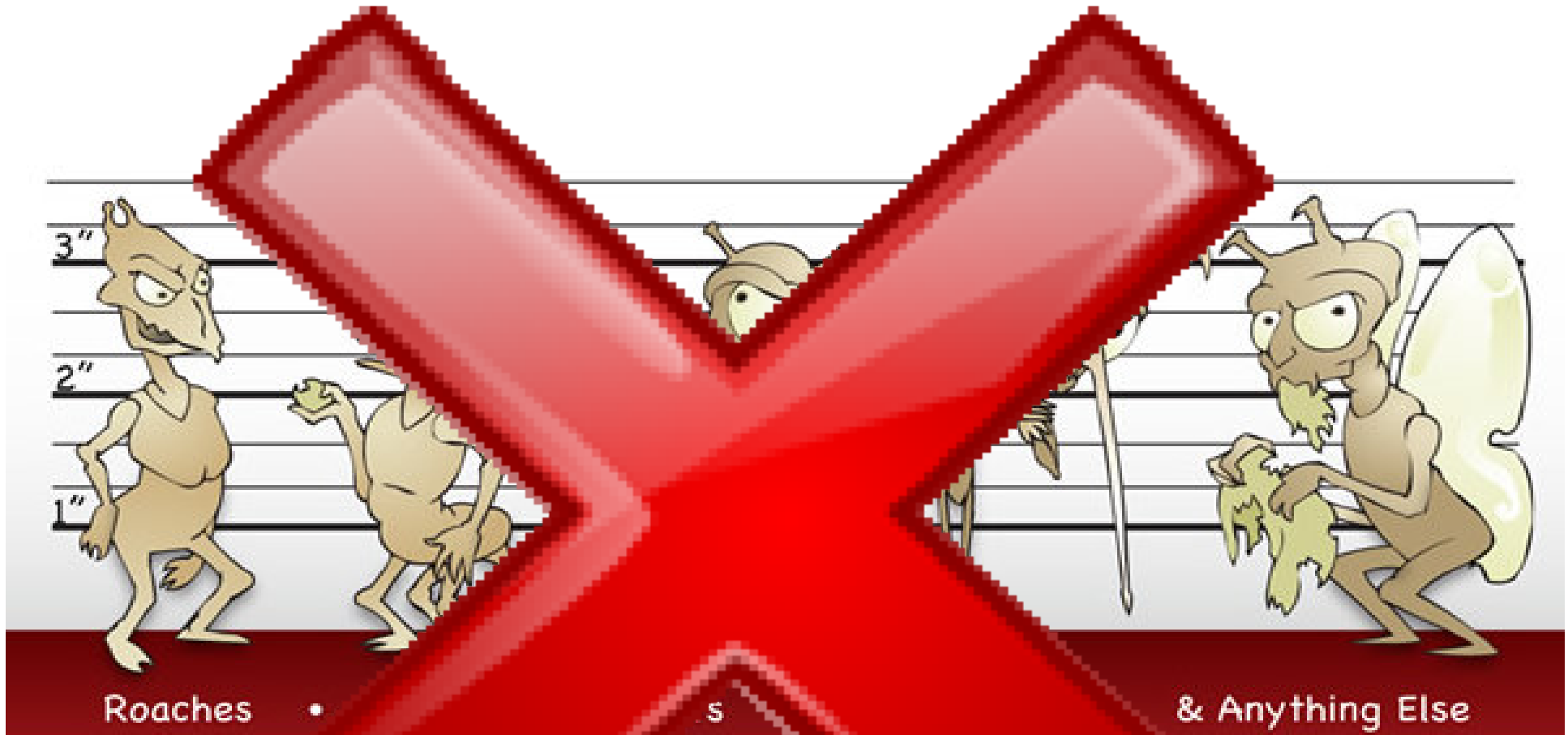


Around buildings they are common under mulch, leaf litter, compost, boards, stones, flower pots, and other items resting on damp ground. Another frequent hiding place is behind the grass edge adjoining sidewalks and foundations.



- **Minimize Moisture, Remove Debris**
- **Seal Pest Entry Points**
- **Insecticides Application**

# Clean and pest free washroom



Have a Pest free washroom!



**THANK YOU**