



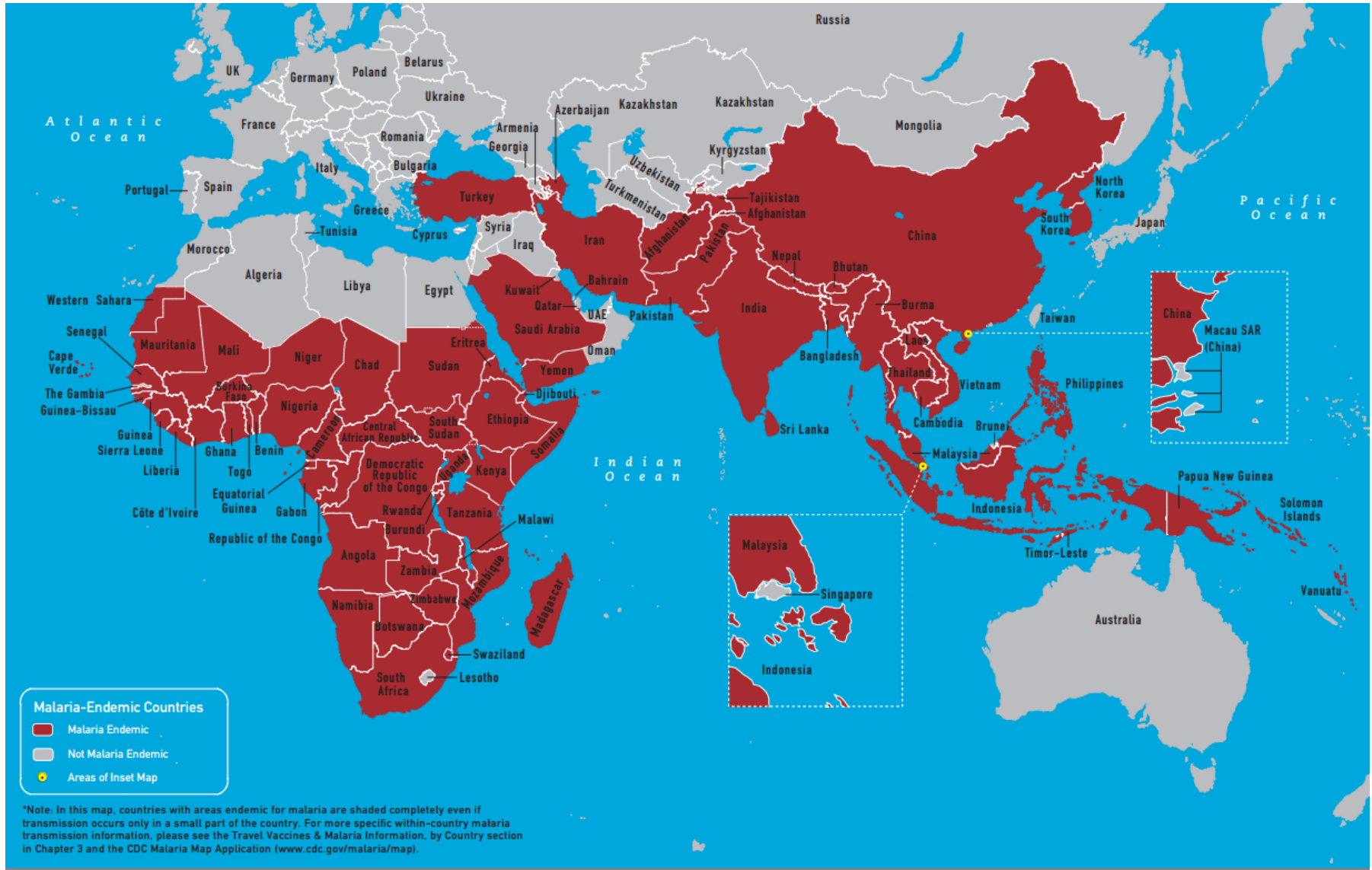
Malaria

An Overview
of
Life-cycle,
Morphology
and
Clinical Picture

Malaria Species

- Five species of malaria infect humans:
 - *Plasmodium falciparum*
 - *Plasmodium vivax*
 - *Plasmodium ovale*
 - *Plasmodium malariae*
 - *Plasmodium knowlesi*

Malaria –Endemic Countries



Malaria – Endemic Countries



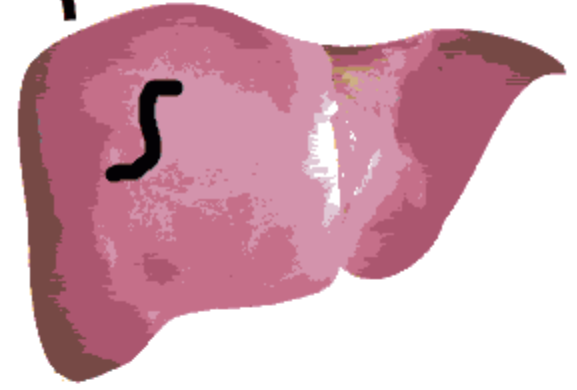
Sporozoites in mosquito saliva



Mosquito bites uninfected human

Mosquito bites infected human

Sporozoites enter bloodstream and migrate to liver, infecting hepatocytes

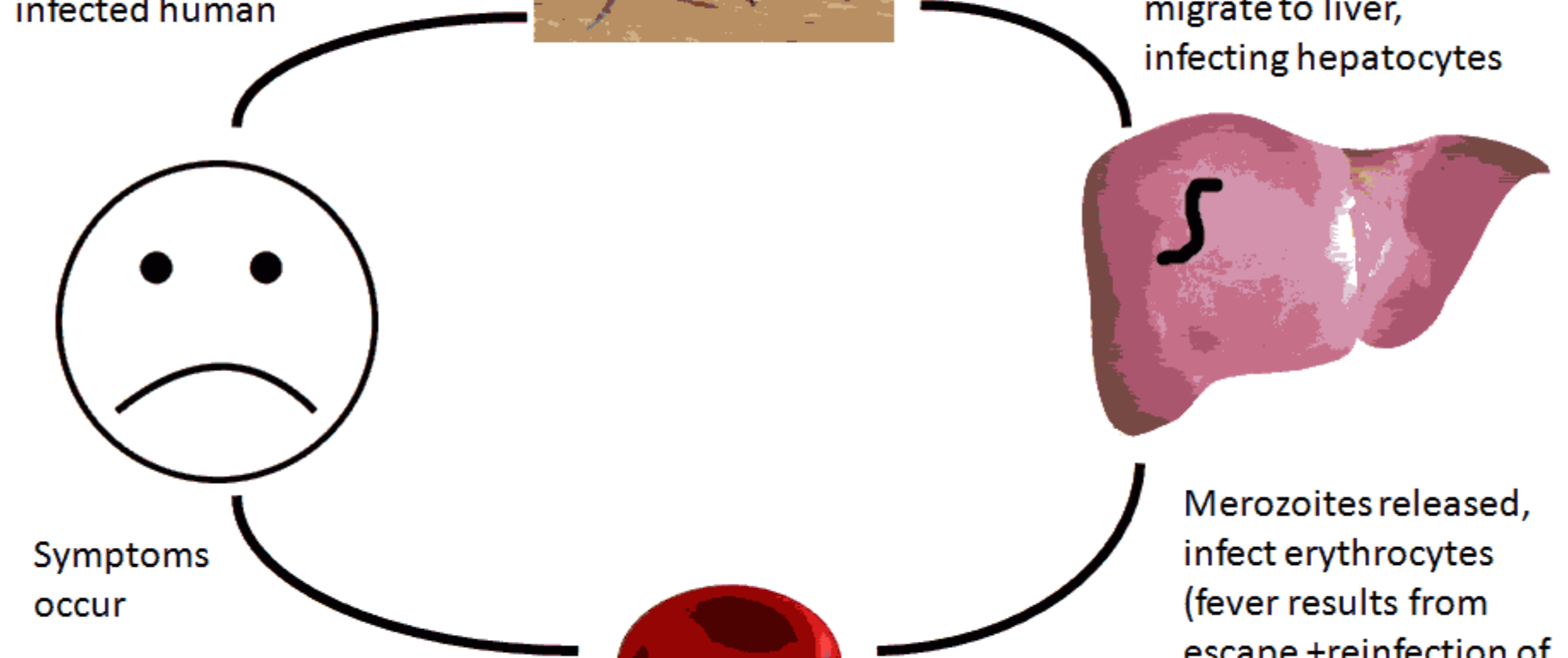


Symptoms occur

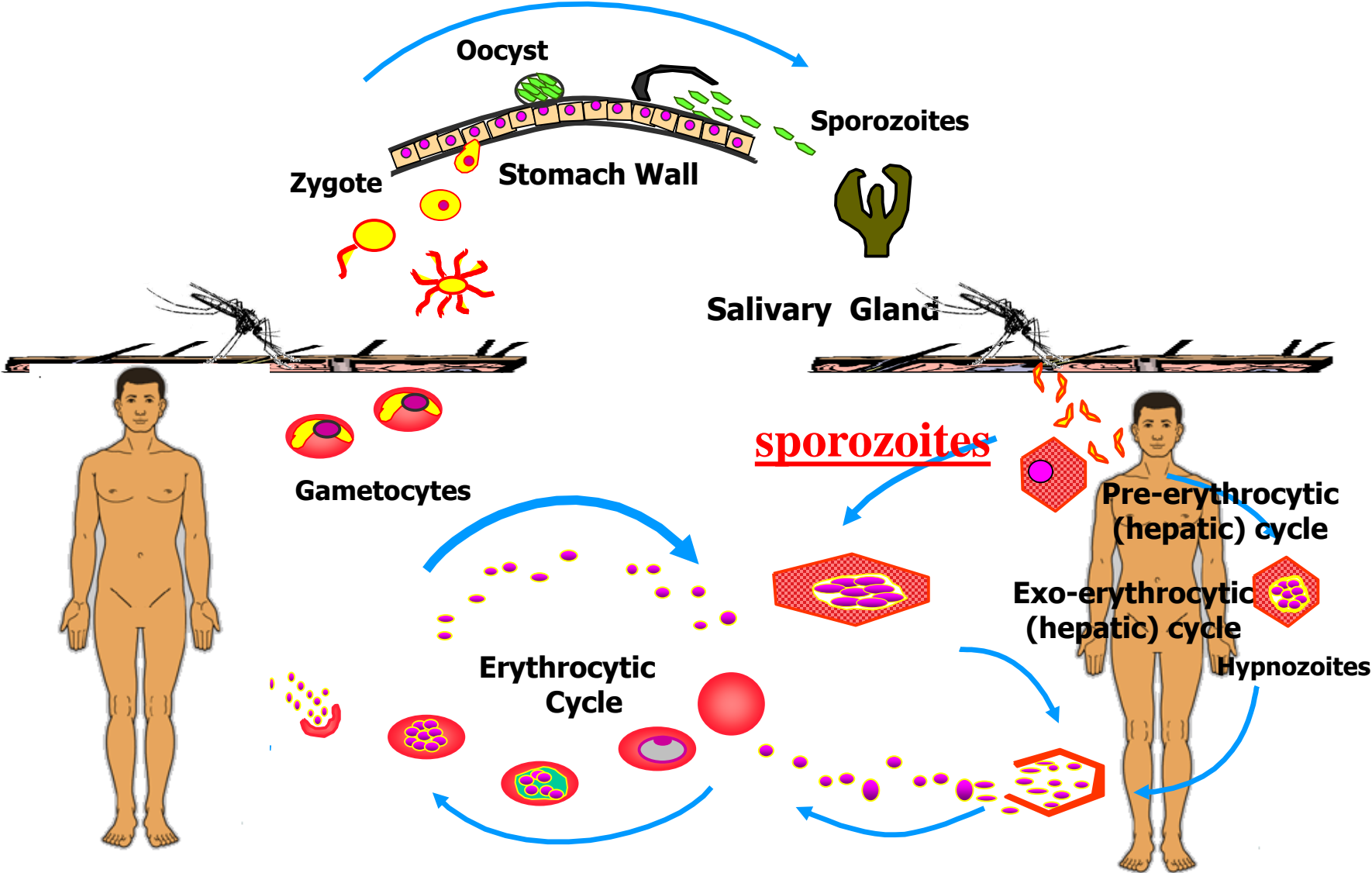
Merozoites released, infect erythrocytes (fever results from escape + reinfection of Merozoites)



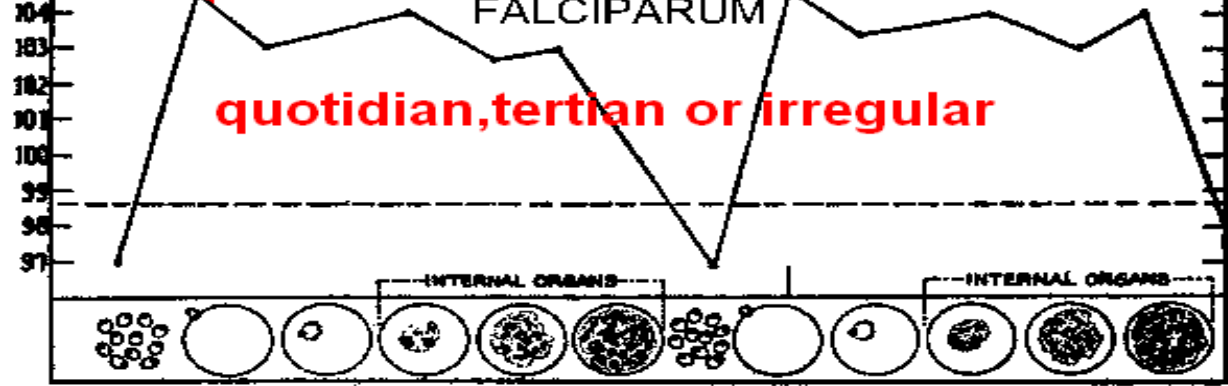
Erythrocytes become "sticky" (PfEMP)



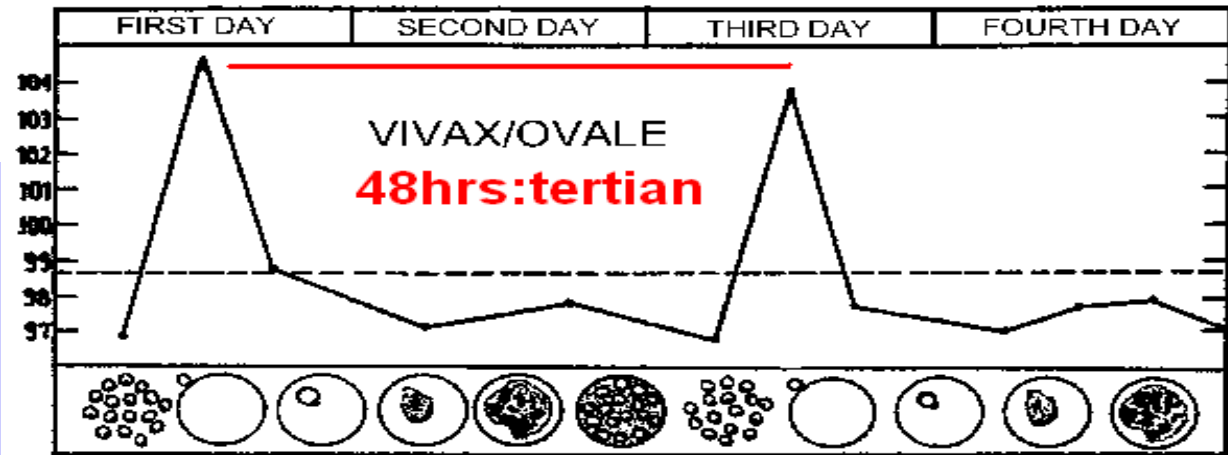
LIFE CYCLE OF MALARIA



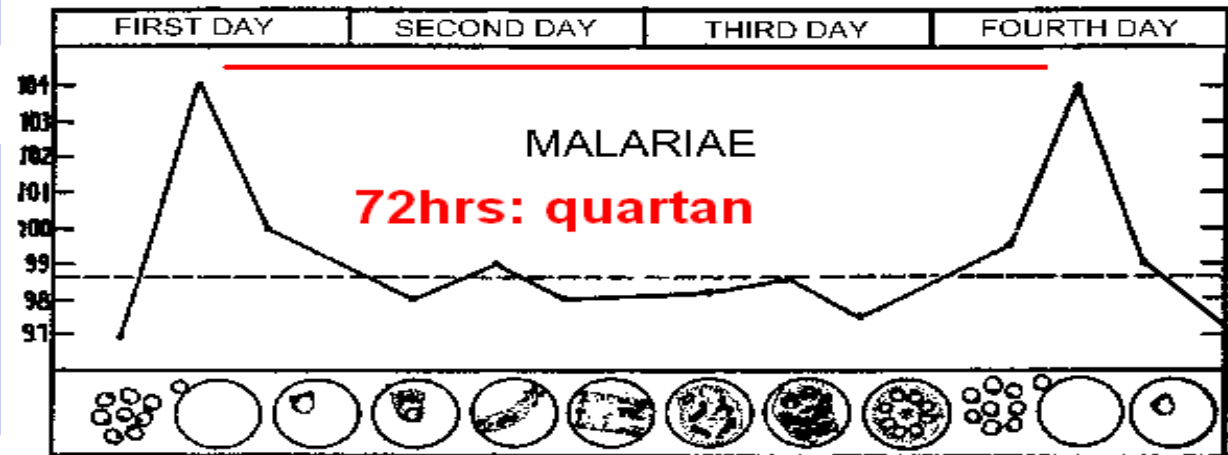
Plasmodium falciparum:



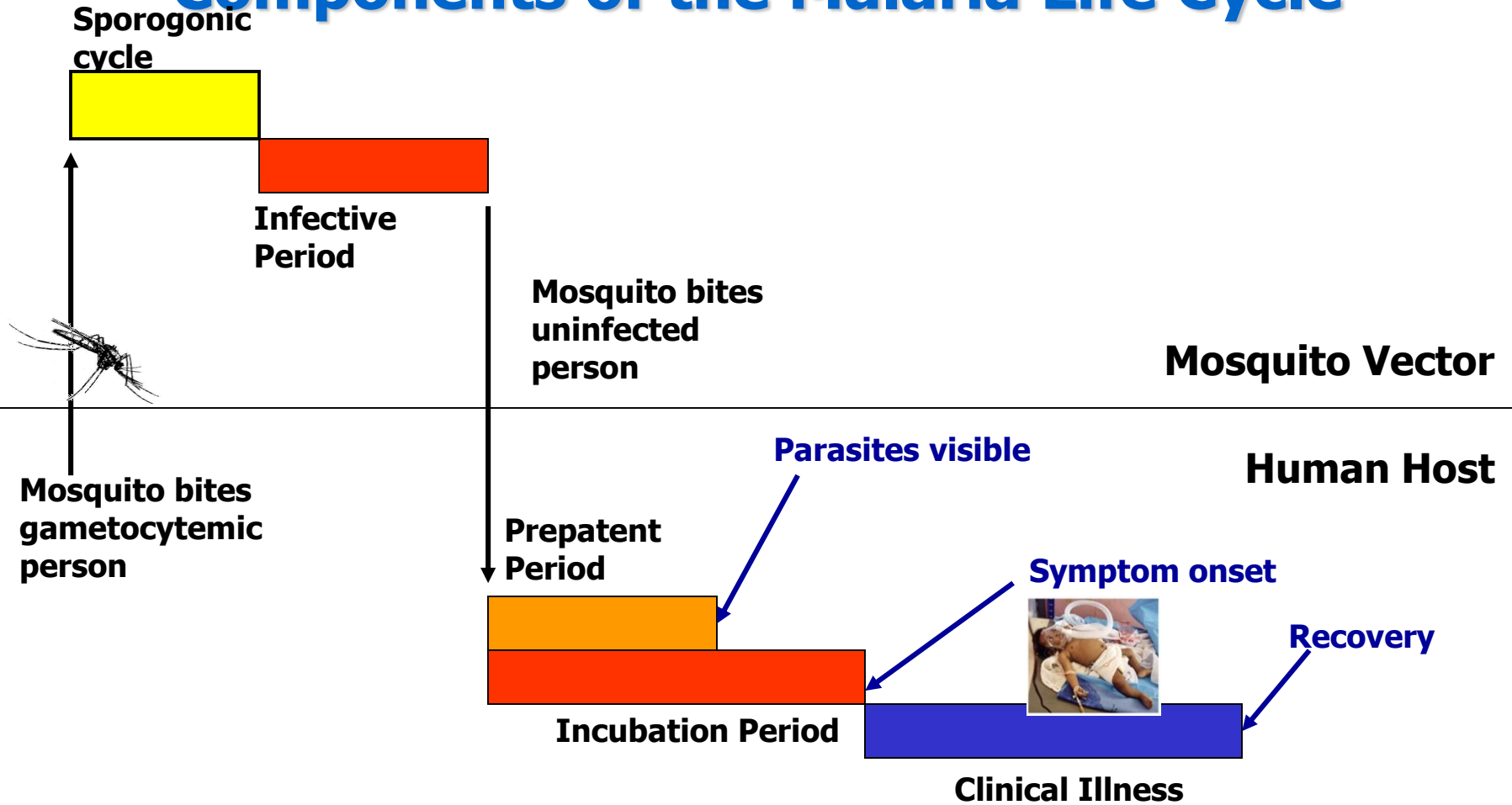
Plasmodium vivax,
Plasmodium ovale



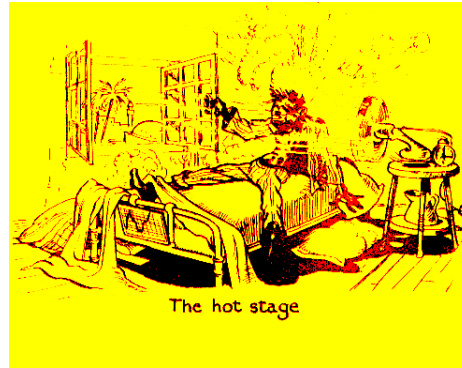
Plasmodium malariae:



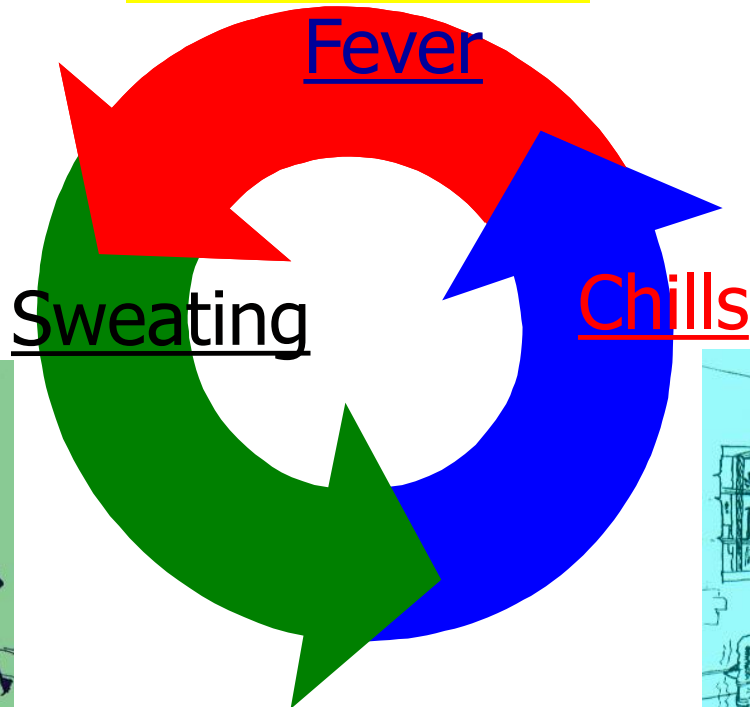
Components of the Malaria Life Cycle



CLINICAL
SIGNS &
SYMPTOMS
OF MALARIA



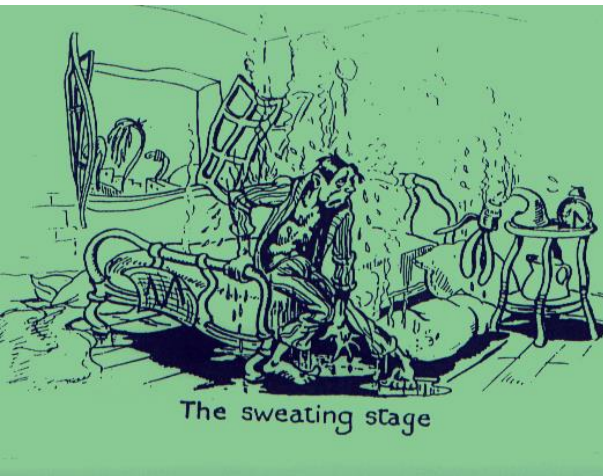
The hot stage



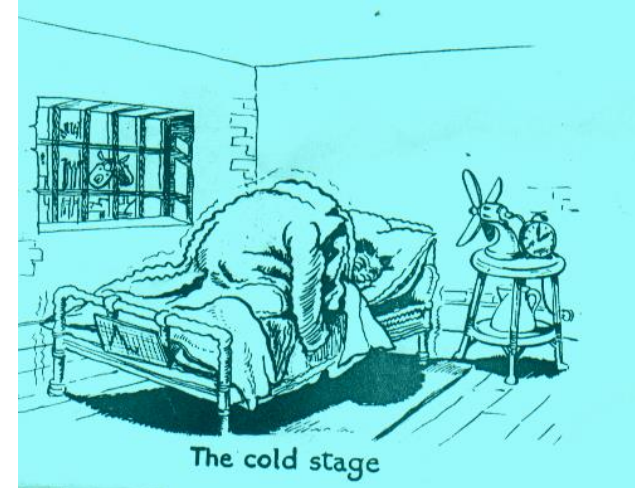
Fever

Chills

Sweating



The sweating stage



The cold stage

Malarial Paroxysm

cold stage

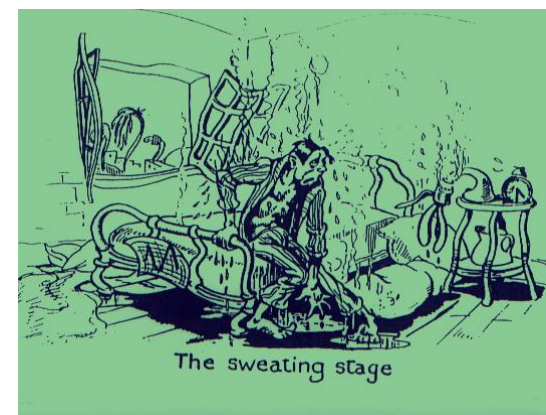
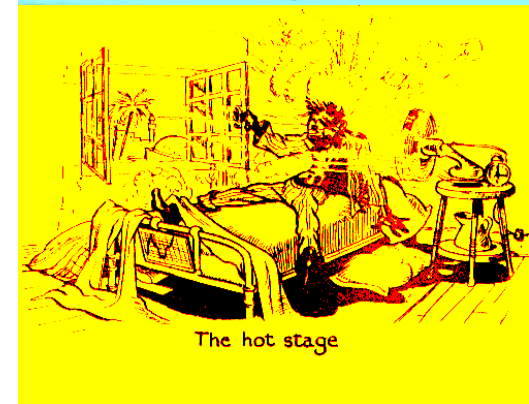
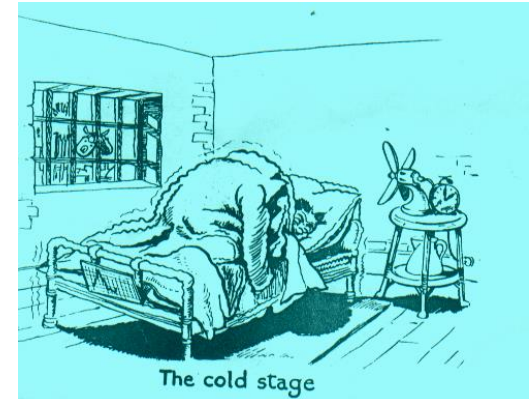
- feeling of intense cold
- vigorous shivering
- lasts 15-60 minutes

hot stage

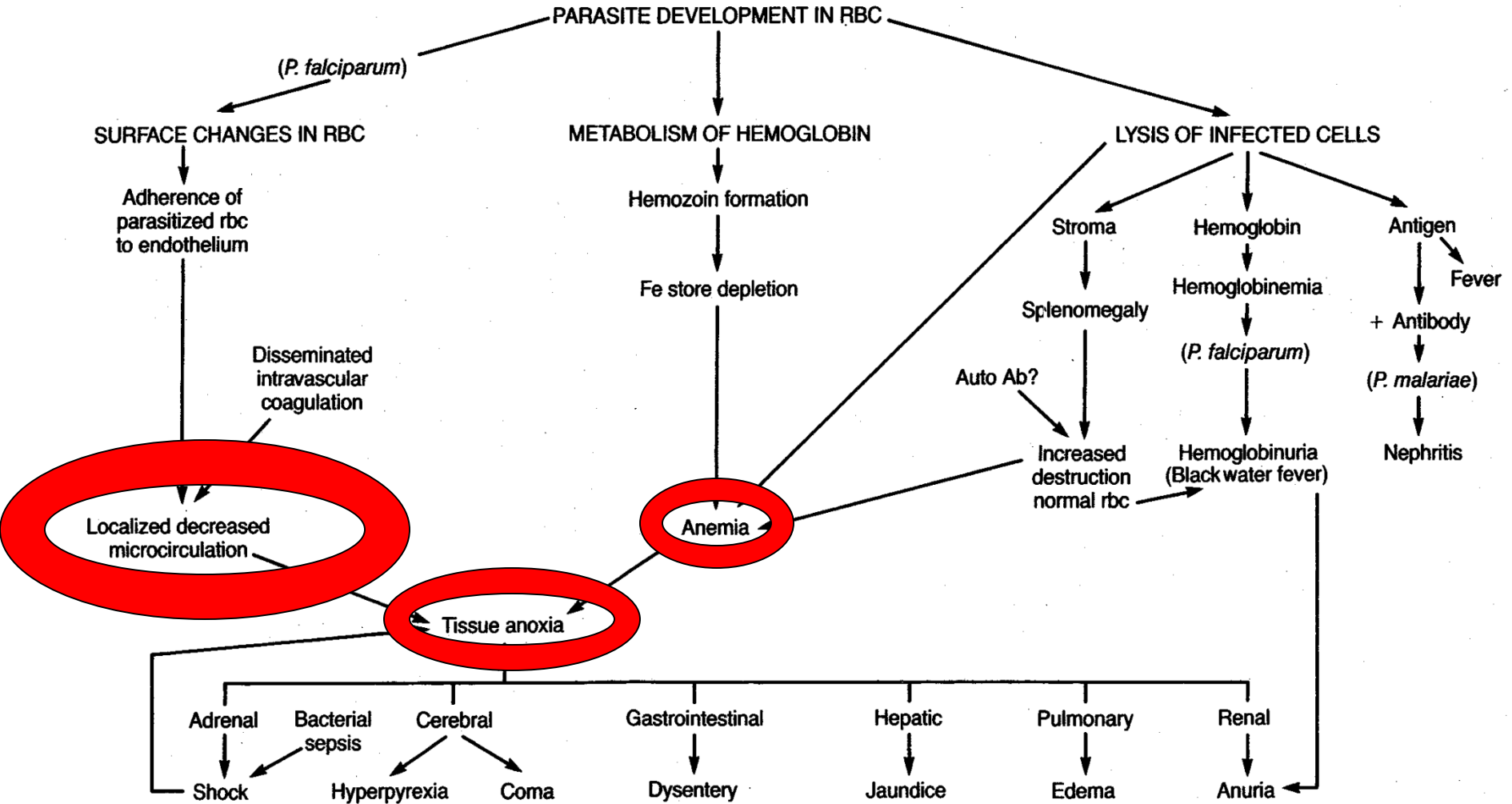
- intense heat
- dry burning skin
- throbbing headache
- lasts 2-6 hours

sweating stage

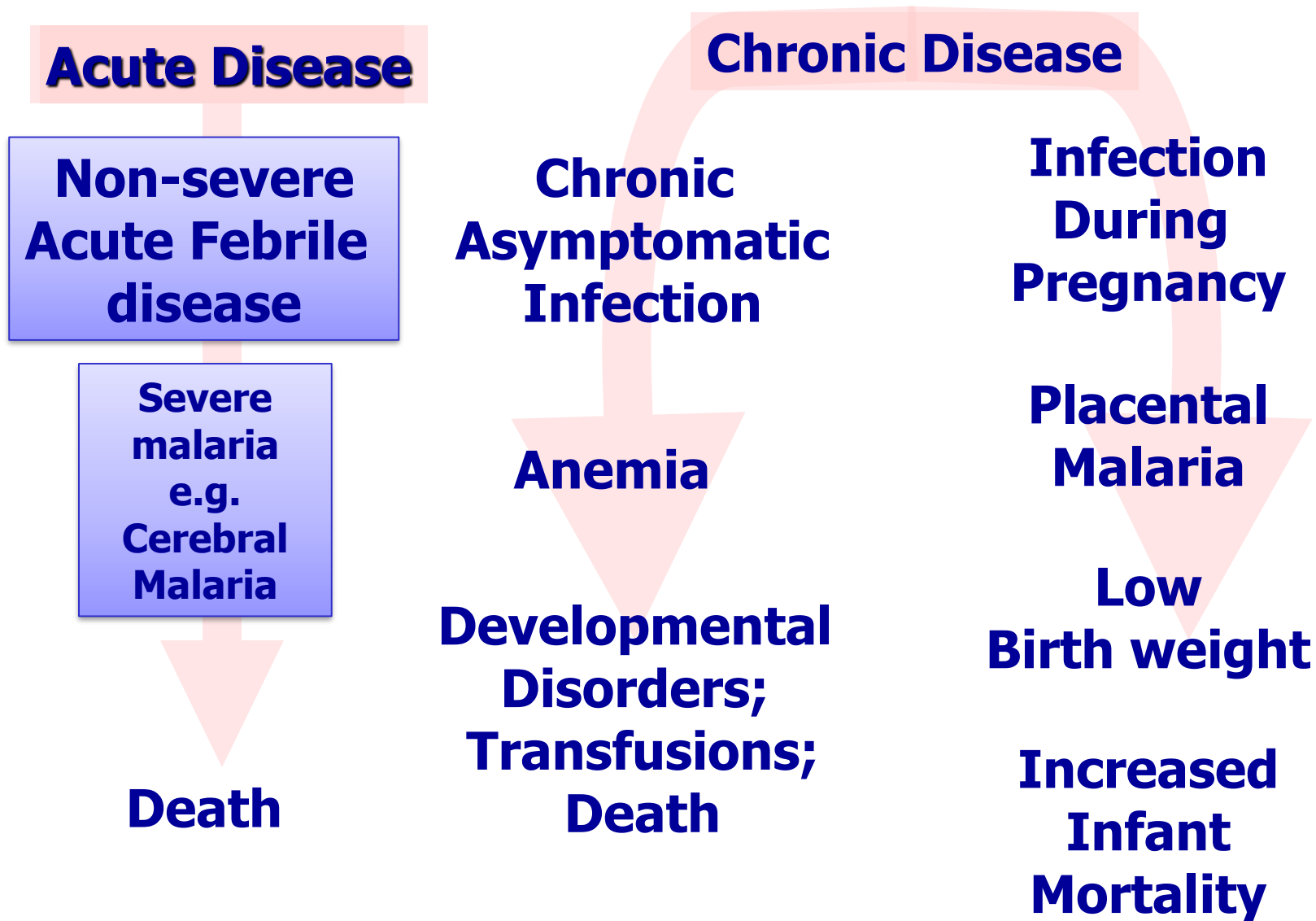
- profuse sweating
- declining temperature
- exhausted and weak → sleep
- lasts 2-4 hours



PATHOGENESIS OF MALARIA



CLINICAL PICTURE



Definition

- Severe malaria is defined as symptomatic malaria in a patient with ***P. falciparum*** with one or more of the following complications:
 - Cerebral malaria (*unrousable coma not attributable to other causes*).
 - Generalized convulsions (*> 2 episodes within 24 hours*)
 - Severe normocytic anaemia (*Ht < 15% or Hb < 5 g/dl*)
 - Hypoglycemia (*blood glucose < 2.2 mmol/l or 40 mg/dl*)
 - Metabolic acidosis with respiratory distress (*arterial pH < 7.35 or bicarbonate < 15 mmol/l*)
 - Fluid and electrolyte disturbances
 - Acute renal failure (*urine < 400 ml/24 h in adults; 12 ml/kg/24 h in children*)
 - Acute pulmonary edema and adult respiratory distress syndrome
 - Abnormal bleeding
 - Jaundice
 - Haemoglobinuria
 - Circulatory collapse, shock, septicaemia (algid malaria)
 - Hyperparasitaemia (*≥ 10% in non-immune; ≥ 20% in semi-immune*)

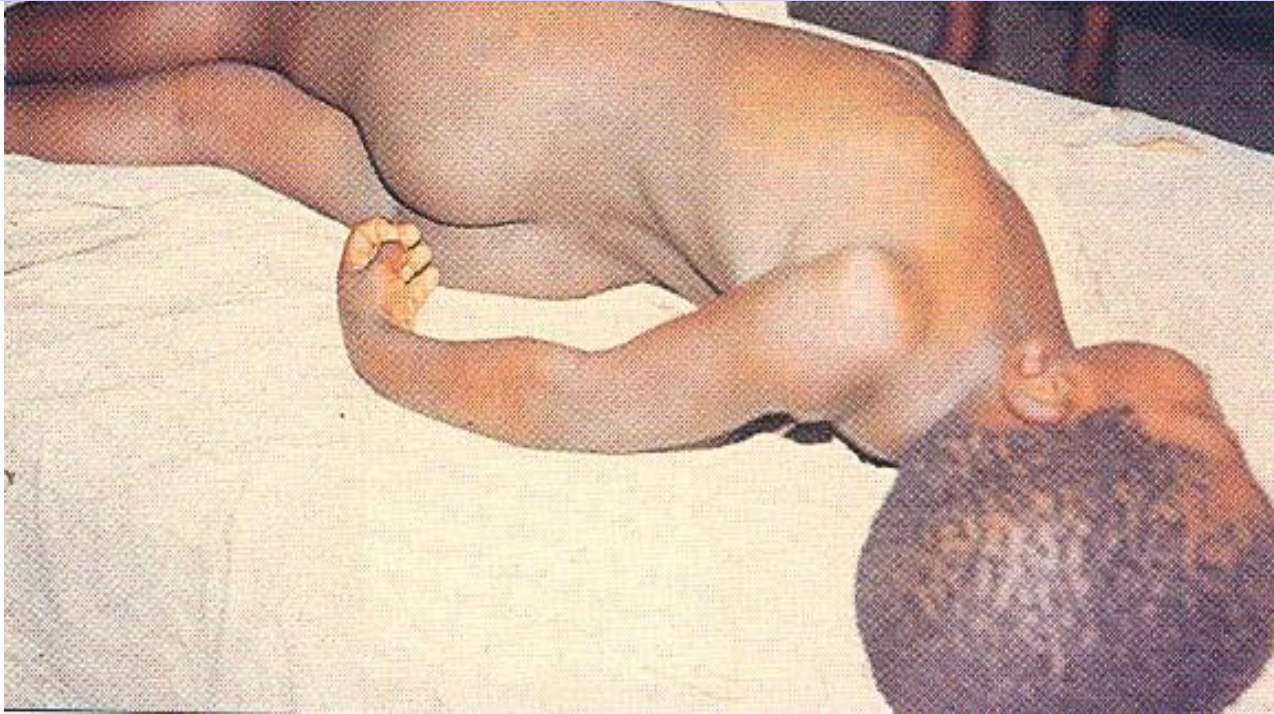
Definition

- *Uncomplicated malaria is defined as:*

Symptomatic infection with malaria parasitemia without signs of severity and/or evidence of vital organ dysfunction.

Complications of malaria :

Cerebral malaria



Opisthotonos in an unrousably comatose child with cerebral malaria. The cerebrospinal fluid cell count was normal

Complications of malaria :

Pulmonary oedema



© D. A. Warrell



Complications of malaria : anaemia



**Child with severe
malaria anaemia
and no other
malaria
complication**

***Child with
severe malaria
anaemia in
conjunction
with acidosis
and respiratory
distress***



Malarial haemoglobinuria



Clinical Picture :

Haemoglobinuria associated with malaria (“blackwater fever”) is uncommon and malarial haemoglobinuria usually presents in adults as severe disease with anemia and renal failure.

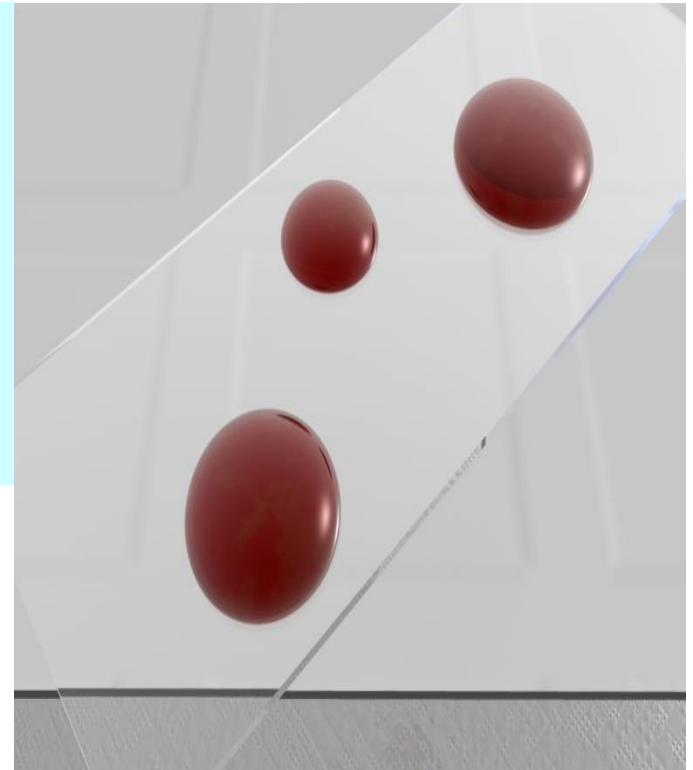


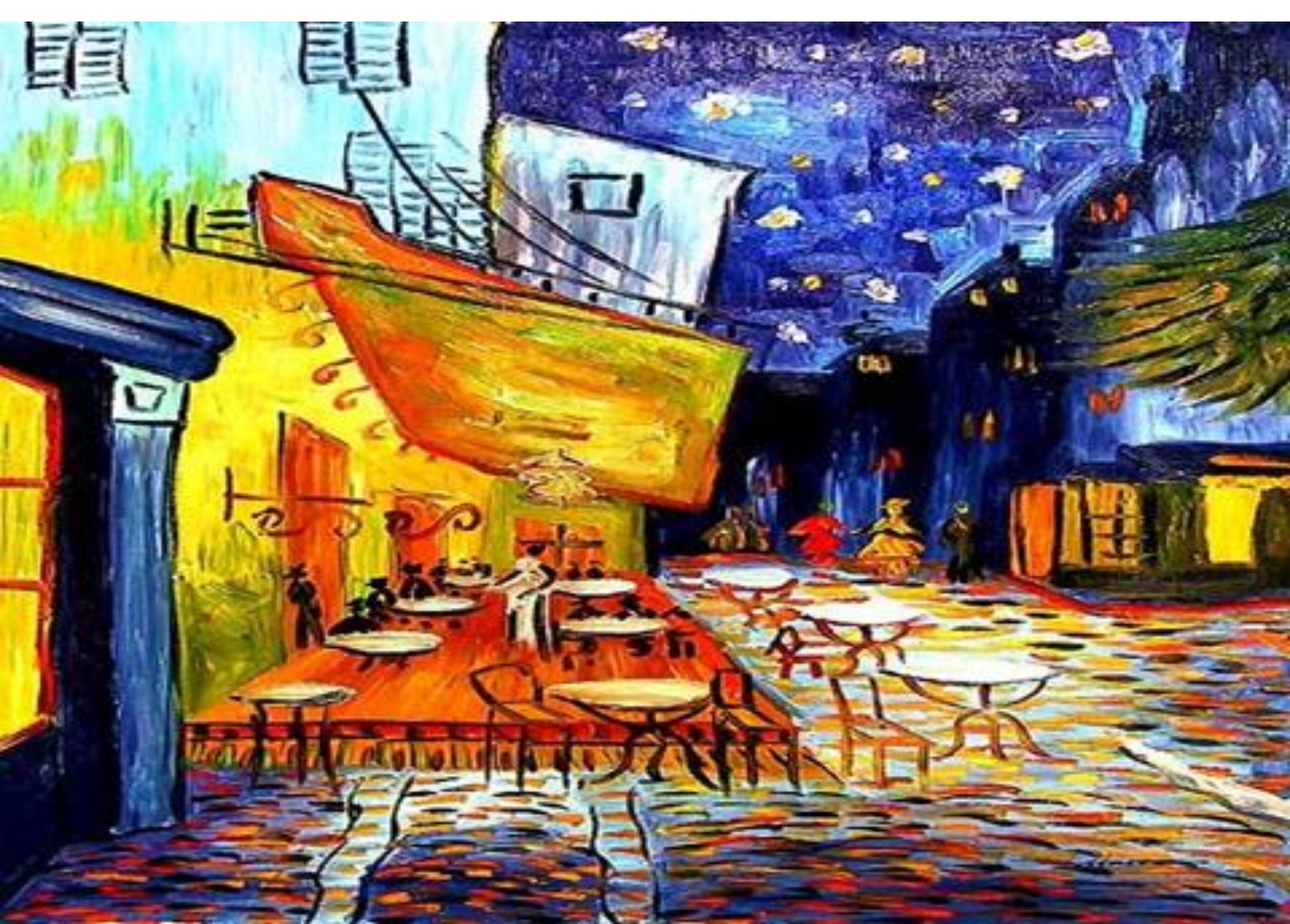
Common methods for parasitological diagnosis of malaria

The two methods common in use :

1: Light microscopy

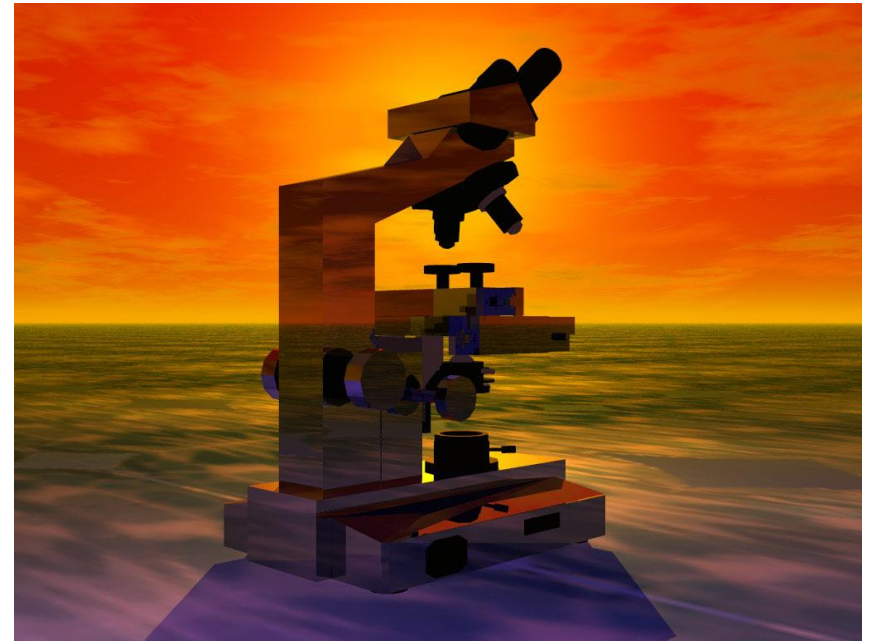
2: Rapid diagnostic tests (RDTs).



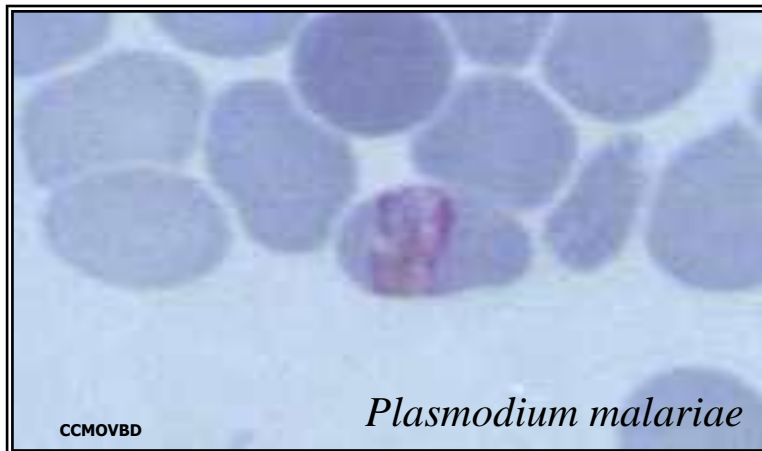
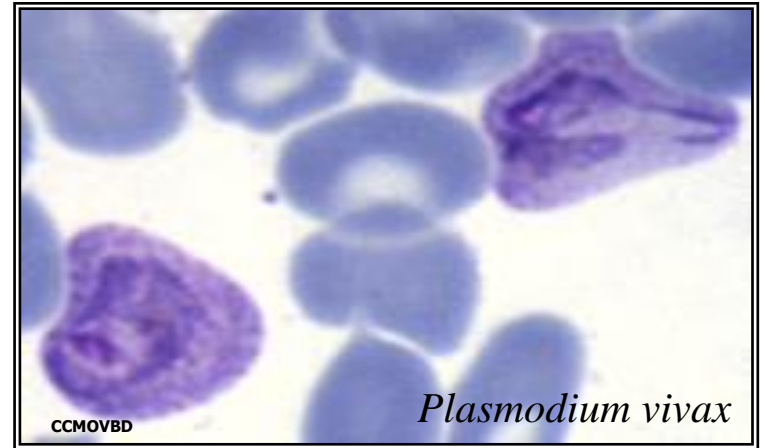
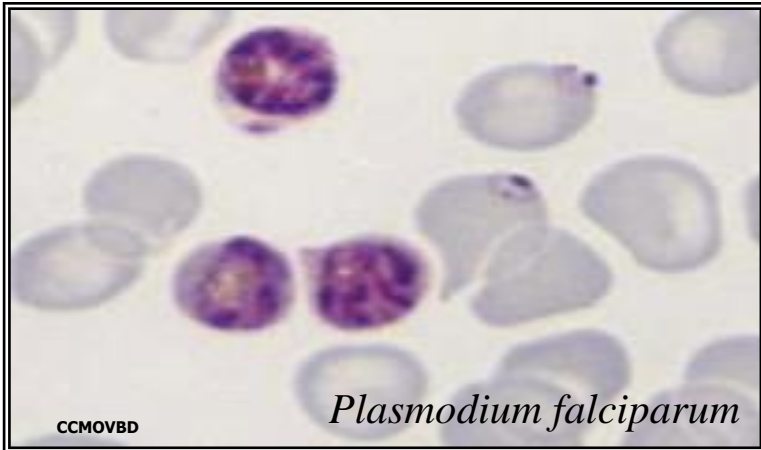


Microscopy is the gold standard for diagnosis of malaria

- Parasite density
- Species diagnosis
- Monitoring response to treatment



Laboratory diagnosis of malaria

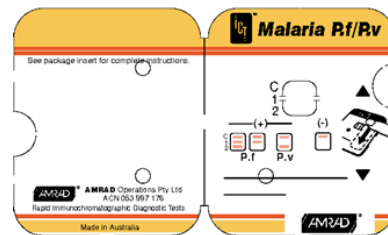


Laboratory diagnosis of malaria

Rapid diagnostic tests detect malaria antigens

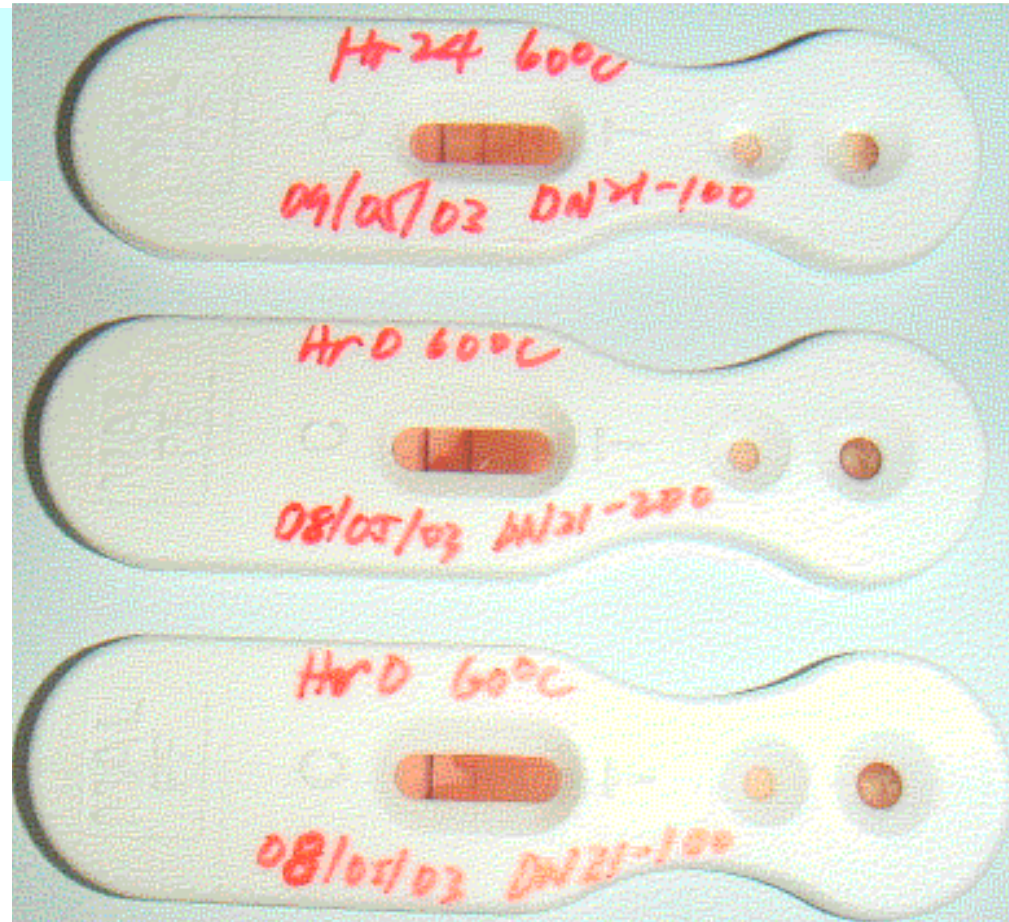
The products come in a number of formats:

- Plastic cassette
- Card
- Dipstick
- Hybrid cassette-dipsticks

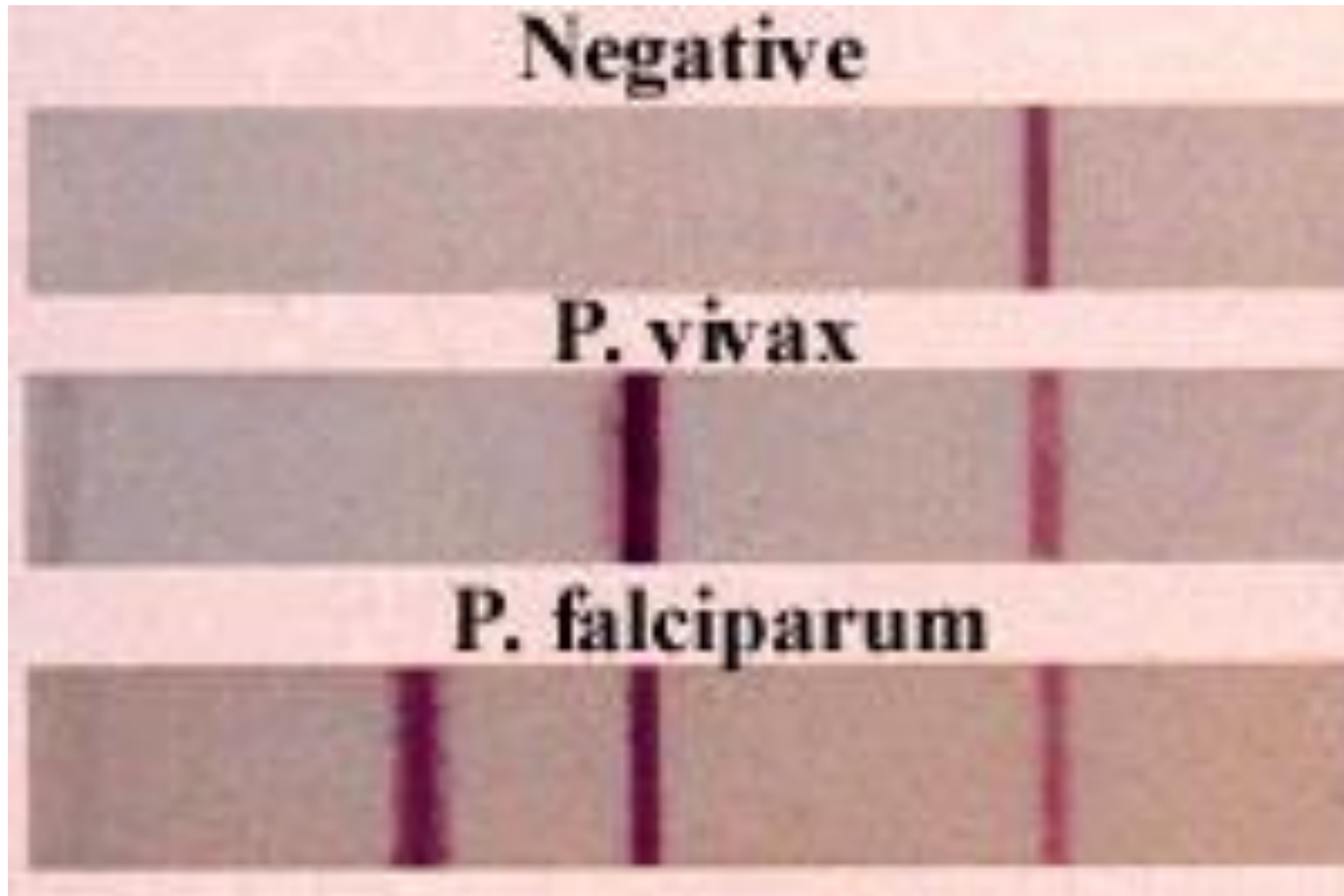


Rapid diagnostic tests detect malaria antigens

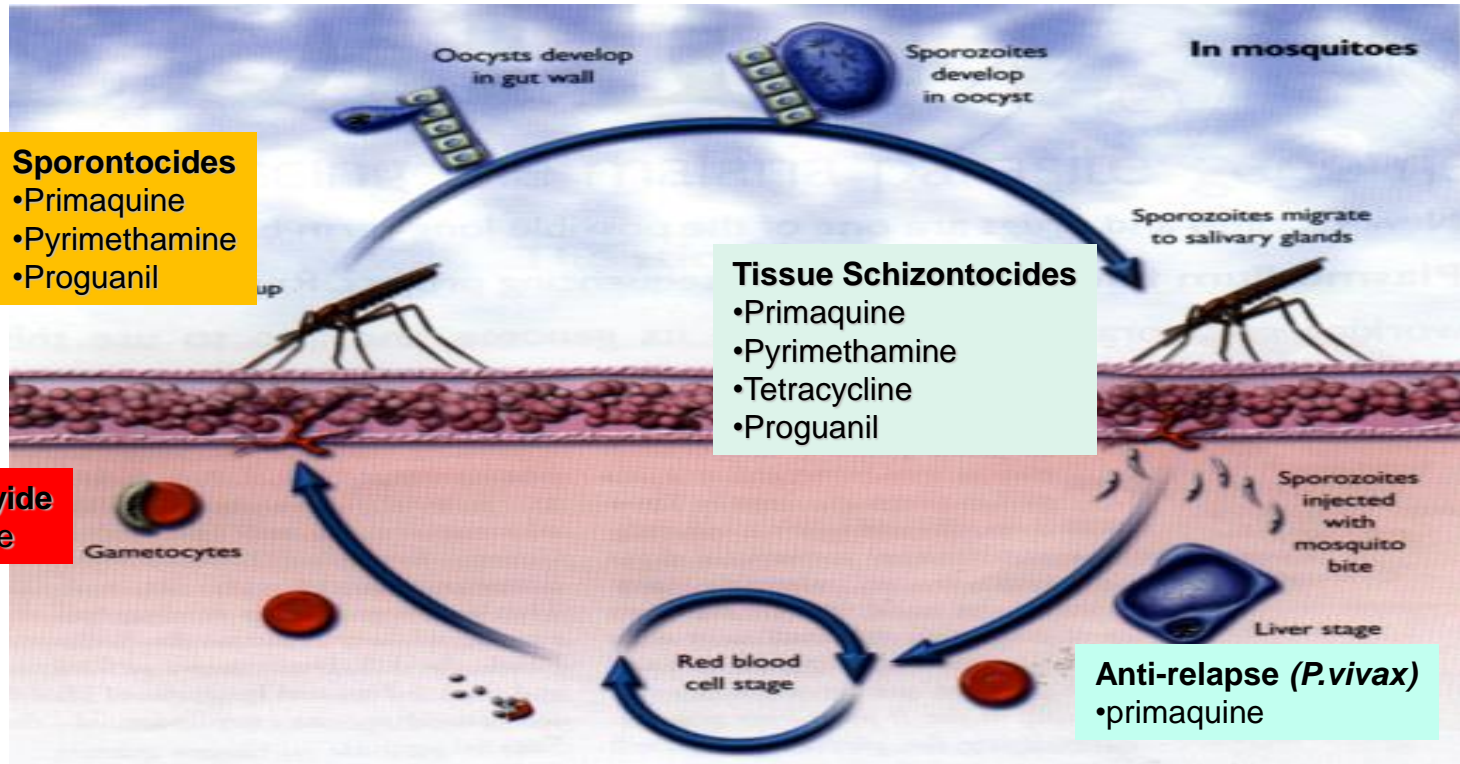
Plastic cassette format of RDT



Rapid diagnostic tests detect malaria antigens



ACTION OF ANTIMALARIAL DRUG IN THE DIFFERENT LIFE STAGES OF THE MALARIA PARASITE



Wellcome Trust (Modified)