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Pediatrics & Travel Medicine  
1/15/09

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## Clinical approach

- History of illness
  - Duration, location, symptoms, onset, intensity, remedies
- Past history
  - Medical, surgical, medications, allergies
- Social history
  - Travel, occupation, housing, exposures, hobbies, pets
- Review of systems

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## Physical exam

- Complete vs. focused
  - Vital signs: temperature, pulse, respiration, blood pressure, weight
- Laboratory studies
- Radiology

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## Physical Examination

- Rash → dengue, typhoid, onchocerciasis
- Eschar → typhus, borrelia
- Jaundice → hepatitis, malaria, leptospirosis, cystic liver disease (hydatid)
- Mucous membranes → VHF, YF, dengue
- Lymphadenopathy → dengue, Lassa fever, LGV, typhus
- Hepatosplenomegaly → malaria, hepatitis, Schistosomiasis, typhoid, dengue, leish., RMSF

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## Diagnostic procedures

- Abdominal ultrasound
- CT/ MRI
- Bone marrow culture
- Viral serology
- Parasite serology
- Skin snips
- Upper GI
- Rectal/bladder biopsy

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## Specific exposures

- |                                   |   |
|-----------------------------------|---|
| Raw/undercooked food              | → hepatitis, enteritis, worms                     |
|                                   | → Salmonella, Shigella                            |
| Untreated water/milk              |   |
|                                   | → schistosomiasis, leptospirosis, enteric viruses |
| Fresh water                       |   |
|                                   | → hepatitis, HIV, syphilis, GC, LGV               |
| Sexual contact, tattoos, piercing |   |

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## Insect exposure

- Mosquitos → Malaria, dengue
- Ticks → typhus, borreliosis, relapsing fever
- Reduviid bugs → Chagas disease
- Tsetse flies → Trypanosomiasis

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## Specific exposures

- food
- freshwater exposure
- swimming
- insect bites
- animals
- sexual contact
- tattoos, acupuncture, dental work
- barefoot



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## Physical Examination

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Incubation Periods for Tropical Diseases\*

SHORT (< 10 days)	<b>Arboviral infections (including dengue and YF)</b> Typhus fever Plague Paratyphoid fever Bacterial enteropathogens Anthrax
INTERMEDIATE (10-21 days)	<b>Malaria (especially P. falciparum)</b> Hemorrhagic fevers <b>Typhoid fever</b> Scrub typhus <b>Brucellosis</b> African trypanosomiasis <b>Leptospirosis</b>
PROLONGED (>21 days)	<b>Malaria</b> Viral hepatitis Leishmaniasis Rabies Amoebic liver abscess Tuberculosis Filariasis Schistosomiasis

\* Adapted from GT Strickland, Hunter's Tropical Medicine

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CASE 1

35 yo female from Ica, Peru with a 3 day h/o insidious abdominal pain- RLQ and epigastric with fever, chills, jaundice.

Symptoms increase with eating fatty foods.

Past hx: Gallbladder problems diagnosed last year with a brief episode of jaundice.

She lives in a house with sewage and water service. Sheep, dogs, cats and chickens in a corral.

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Parasites?

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In the operating room...  
a tense gallbladder was aspirated,  
then removed with a soft  
compressible mass.

Opened and multiple small cysts and a  
10 cm cyst with multiple loculations.

Ideas?

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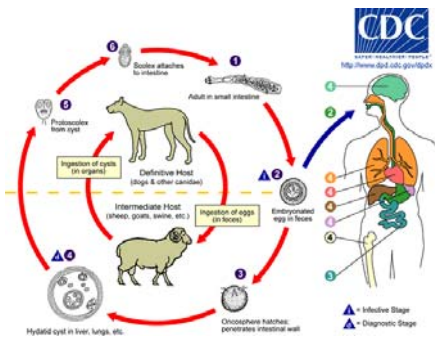
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## Ecchinococcus



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## Ecchinococcus

- Caused by the larval stage of cestodes of the genus *Ecchinococcus*.
- Most frequently in cystic form
- Occur worldwide
- Usually transmitted when dogs ingest organs from infected animals

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## Ecchinococcus- clinical

- Asymptomatic
- Localize with growth ~1 cm / yr
- Liver -Abd pain, nausea, vomiting, abscess
- Lung- incidental or sig symptoms if close to tracheal tree. "Water lily sign" , salty emesis
- Bone
- CNS
- Renal

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## Ecchinococcus granulosus

- Geography
- 60% liver cysts, 29% lung cysts
  - Occasionally in spleen and long bones
- Usually solitary cyst

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## Ecchinococcus

- Treatment
  - Surgical – depends on location
  - Medical – albendazole alone
    - Treatment needed for months
    - Monitor toxicity of medication on liver and bone marrow every 2 weeks.
  - Some controversy
    - >7cm vs. < 7cm

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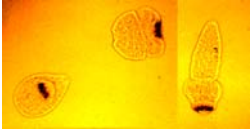
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## Ecchinococcus



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### CASE 2

28 yo woman from San Francisco presented with a 36 hr history of crampy abdominal pain in the right lower quadrant preceded by nausea and vomiting.

Travel history notable for a trip to Pacific coast of Mexico 5 months prior, beach side huts.

PE: T 38.9 C P 92 BP 100/60 Appears ill

Increased bowel sounds with rebound tenderness RLQ

Labs: WBC 17.4

Xray: evidence of obstruction

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Went to OR for appendectomy. Distal small bowel was edematous, inflamed and indurated along the mesenteric border. Had a bowel resection and did fine.

Pathology surprise.....

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## Anisakis

- Helminth that bores into the bowel wall
- Higher incidence in area where raw fish is eaten
- Usually, a violent reaction occurs after ingestion, worm is coughed up and pt is fine.
- If worm passes into small intestine, severe inflammatory reaction can occur in a few weeks
- Treatment: surgical/endoscopic removal

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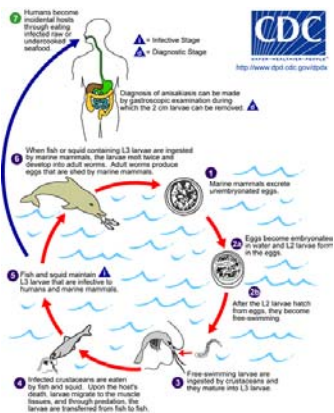
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CASE 3

35 yr old woman presented with 2 months of weight loss, malaise, nausea. No diarrhea, vomiting or fevers.

Travel history: Austria- hotel 8 mo prior, Denver- hotel, Calif- camping, Hiking in N.Az. Family members healthy, 2 young children in daycare.

PE: normal, except 12 lb wt loss/ 2 months

Lab: Chem/CBC normal. Pregnancy test x 2 negative. Thyroid normal

Stool culture neg. EIA Giardia...

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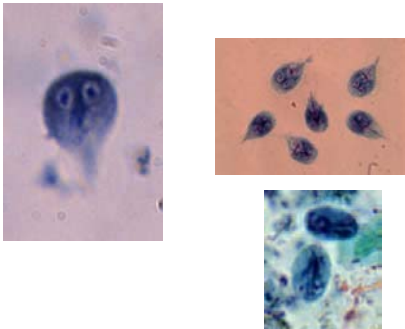
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Giardia lamblia



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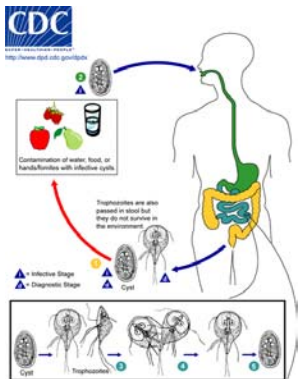
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## Giardia

- Incubation
- Clinical symptoms: few in kids
- Diagnosis : Microscopy vs. antigen detection
- Treatment: Metronidazole / Tinadazole

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### CASE 4

19 yr old female spent 10 months after high school graduation teaching in rural northern Tanzania. She had several episodes of malaria while there and was treated as an outpatient. She took Halofantrine, Artemisinin or Doxycycline for treatment. Slide positive x 4. Self -rx at least 3 other times. She had bloody diarrhea "most of the time" while away and took antibiotics when severe.

She was home 1 day and presented with a h/o fever on and off, malaise, chills, dysuria and headache.

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### Pre-travel preparation:

Vaccines Hep A and B series, tetanus, polio, oral typhoid as directed, meningococcal meningitis, YF, rabies (HDCV)

Malaria: took mefloquine x 2 months. Made her "dazed" and have bizarre dreams, so changed to daily Proguanil x 6 months. Stopped all meds the last 2 mos.

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Travel history

Taught in a small village. Lived with a family. Boiled water. Ate cooked food most of the time. No milk. Unsure of pasteurized cheese.

Used DEET and untreated bednet. Lots of mosquito bites. No tick bites or eschar.

Traveled to Victoria Falls once. Plane stopped briefly in Uganda on return flight. Dogs in village, minimal contact. No other animal contact.

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Labs

WBC 5.3 47G/42L/9M/1Eo

Hct 35, Plts 110K

BUN 13, Cr.9 , RPR neg

UA 25-50 RBC, 25-50 WBC, SG1020, mod blood, esterase positive

Other labs?

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Malaria 2009

- 300 million infections annually, mostly in Sub-Saharan Africa
- (3 million) 881,000 deaths annually
- P.falciparum mortality rate: 4-20%

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# Malaria

*Plasmodium falciparum*

*Plasmodium vivax*

*Plasmodium ovale*

*Plasmodium malariae*



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# Malaria

## Why the big deal?

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## Malaria Distribution and Drug Resistance



Malaria endemic countries in Africa & Asia



Malaria endemic countries in Western Hemisphere

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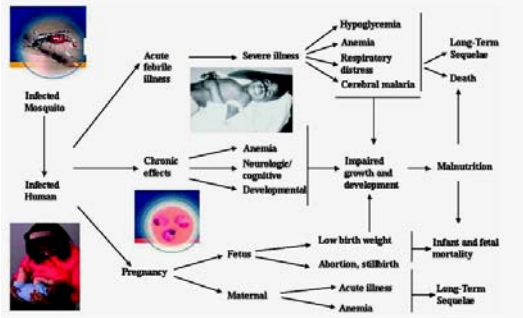


FIGURE 2. Acute, chronic, and pregnancy-related manifestations of malaria.

Breman JG, et al. Am J Trop Med Hyg; 71(S2), 2004

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TABLE 4

Deaths from malaria in Africa in children less than five years of age and total, 2001\*

Cause of death	Range of deaths in children <5 years old
Cerebral malaria	110,000 (no range)
Severe malarial anemia	190,000–974,000
Respiratory distress	110,000 (no range)
Hypoglycemia	153,000–267,000
Low birth weight	62,000–363,000
Deaths	625,000–1,824,000
All malaria deaths in Africa†	962,000–2,806,000

\* Modified from Murphy and Breman.<sup>6</sup>

† Children <5 years of age represent 65% of all deaths in Africa as per Snow and others.<sup>5</sup>

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## Childhood mortality in Africa

- P.falciparum directly attributable deaths
- Plus enhancement of severity of all other diseases
- DALY looking at malaria caused deaths alone does not capture the magnitude of the effect of malaria in children

– Snow RW, et al. Am J Trop Med Hyg, Aug 2004; 71: 16 - 24.

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## Imported malaria

- ~ 1300 cases per year in U.S.
- 40% *P.falciparum*
- Associated with poor anti-malarial chemoprophylaxis vs. compliance
- 90% of *P.falciparum* is from Africa

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## Risk of malaria w/o chemoprophylaxis for 1 month

Oceania	1:5
Africa	1: 50
S. Asia	1:250
S.E.Asia	1:1,000
S.America	1:2,500
Mexico & C. Am.	1:10,000

Steffen; J Wilderness Med 1994; 5:56-66

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## Malaria: Risk to Travelers<sup>1-2</sup>

- 50% of cases acquired during visits (friends/relatives) or tourism
- > 60% of cases, no or non-recommended CDC chemoprophylaxis
- Increased chloroquine/other drug resistance
- Accessibility of medical care during travel

1. CDC. National Center for Infectious Diseases. [www2.ncid.cdc.gov/travel/d/utilityDynamic.asp](http://www2.ncid.cdc.gov/travel/d/utilityDynamic.asp).  
2. WHO. International Travel and Health. [www.who.int/ith/chapter07\\_01.html](http://www.who.int/ith/chapter07_01.html).

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## Who dies from travel acquired malaria?

- No Chemoprophylaxis 21
- Delay seeking care 1
- Missed by MD 13
- Lab misdx 9
- Wrong rx 11

Non-immune : 24 of 37 deaths US, UK, Can.

MMWR 7/20/01; Greenburg et al AIM 1990;113:326,  
Kain et al CMAJ 2001,164;Eurosurveillance 1998; 3:40

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## Malaria: Clinical signs

Fever	97%
Chills	97%
Headache	94%
Nausea/vomiting	62%
Myalgias	50%
Backache	9%
Dark Urine	3%

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## Malaria Infection: Characteristics<sup>1</sup>

- Onset highly variable, 1 wk-1 y
- Fever, headache, back pain, chills, sweating, myalgia, nausea, vomiting, diarrhea, cough
- Possible coma, renal failure, pulmonary edema, death
- History: travel in area of malaria transmission; fever of unknown origin without travel history
- Diagnosis: Giemsa-stained film of fresh blood

CDC. CDC Surveillance Summaries. Malaria Surveillance—United States, 1999.  
MMWR March 29, 2002;51(SS01):15-28.

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## Malaria: Laboratory diagnosis

- Thin smears
  - Percent parasitemia
- Thick smear
- Rapid antigen testing
- CBC findings
  - thrombocytopenia
  - leukopenia

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## Malaria prevention

- Physical barriers
  - clothing
  - bednets
- Insect repellent- DEET
- Chemoprophylaxis



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## Malaria treatment

Location, location, location

- Chloroquine
- Mefloquine
- Atovaquone/proguanil
- Quinine + Doxycycline
- Artemisinin derivatives
- (Halofantrine)

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CASE 5

13 yr old male with a 3 yr h/o progressive painless papules and plaques to the upper lid and face. He bathed often in the river Puro near his home in Peru.

Severe headaches began one yr before facial lesions , along with blurred vision, vomiting and weight loss. No seizures. Episodes of epistaxis have occurred over one year and sense of smell gone.

PE: Widened thick nasal bridge with plaques extending to cheeks. Edema of the filtrum, upper lip and nasolabial folds. Scabbed superficial lesion on R upper lip.

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Biopsy:

diffuse granulomatous infiltrate;  
multinucleated giant cells. No amoeba.

Differential diagnosis:

Rhinoscleroma, Lymphoma, Wegner's  
granulomatosis, cutaneous TB,  
Leishmaniasis, paracocci, free living  
amoeba

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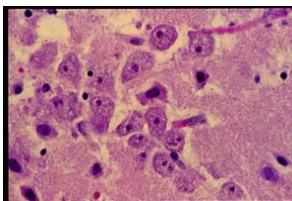
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*Balamuthia mandrillaris*



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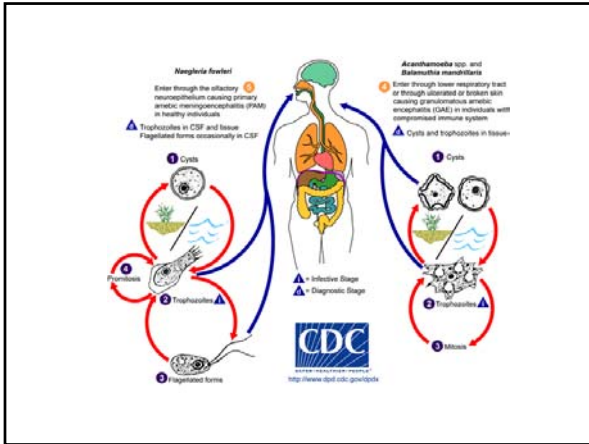
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### Free living amoeba

- Naegleria
- Acanthamoeba
- Balamuthia

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### Free living amoeba

	Naegleria	Acanthamoeba
Epi	Healthy	chronically ill
Incub	4-6 d	>10d
Route	olfactory	lung
Dissem	CNS	heme
Onset	sudden	chronic
CSF	acute	chronic meningitis
Path	acute	granulomatous

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## Balamuthia

- Relatively newly discovered
- Granulomatous meningitis
- Cutaneous facial lesion frequent, always precedes CNS disease
- Peru cases most frequently reported
  - Pts not ill;
  - CNS involvement 1-4 mo after skin lesion
  - Marked vasculitis on pathology

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## Balamuthia

- Initial description in 1990
  - Pts not ill
  - Few cases (~100)
    - US – mostly in immunocompromised
    - Latin America - immunocompetent
  - True ecologic niche not found to date
    - ?bathing in river/whirlpool ; contaminated fresh water
  - CNS involvement 1-4 mo after skin lesion
  - Marked vasculitis on pathology
- No effective treatment

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## Balamuthia

- No effective treatment
- Treating the skin lesion with Amphotericin may improve it, but CNS disease still occurs
- Combination treatment with other anti-fungal drugs aggressively has halted the CNS disease in 2 cases to date ( 3 yr disease free so far)

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CASE 6

44 yo male teaching cave rescue in Belize jungle presented immediately on return with fever, profuse sweating , nausea, abdominal pain, anorexia. Diagnosed and treated for typhoid fever; hospitalized 1 week.

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Travel history: Central Belize, in caves 6 hrs per day, stayed in jungle lodge at night. Adventurous eater, but no raw fish or meat. Ate washed vegetables daily. Water filter (camping grade) or boiled water. No sexual contact. Mosquito nets on bed. Lots of insect bites. Swam in river daily.

Played with monkey that lived in camp. Monkey appeared healthy. Owner reported he was vaccinated to rabies. Monkey had several Bott fly larva that pt removed without incident.

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3 weeks after hospital discharge, he presented with the complaint that “ things are crawling under my scalp”. No itching. No other unusual skin lesions. No psychiatric history. MD friend gave him Keflex for skin infection- no help

PE: 6 raised red papules scattered over top of head. No discharge, but visible central opening , approximately 2 mm on each.

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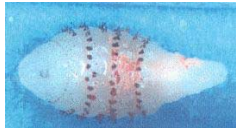
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Stephen Higgs, Ph.D. with the Department of Pathology at UTMB

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## Myiasis

- Fly larva (*diptera*) invade living tissues.
- Clinically divided into body sites:
  - Cutaneous
  - Body Cavities (eye, ear, mouth, anus or vagina)
  - Gut lumen



Tropical Med. And Parasitology: Peters

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## Dermatobia hominis

- Human bot fly larva
- Widely distributed in Central and South America
- Eggs reach a suitable host by gluing onto the abdomen of a mosquito, thereby getting inserted to host on puncture.
- Develop a boil-like pocket with a punctate air hole
- 3 larval molts
- African Tumbu fly larvae can bore directly, no intermediary mosquitos needed ( laundry issues)

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# Cutaneous Myiasis

- TUMBU FLY:

- Sub-saharan Africa and southern Spain.
- Usually imported in tourist who went on "Safari" & dried clothes on ground--rodents & dogs are the usual host.
- Painless penetration of skin in about one minute. Usually serous drainage with occasional regional lymph node enlargement.



Tropical Medicine and Parasitology: Peters

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# Treatment

- Surgical removal
- Occlusive techniques
  - Toothpaste cap filled with vaseline taped over lesion
  - 1-2 strips of uncooked bacon placed over the air hole overnight
- Commercial venom extractor
- Squeeze

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