

# Travel Related Infectious Disease

Dr. Robert Wheeler

A Webber Training Teleclass

## Travel Related Infectious Disease

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Hosted by Paul Webber  
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## Risks of Foreign Travel

- ✦ More than 60 million people from the United States and 17 million from Canada travel internationally each year
- ✦ 25% of these travelers go to developing countries
  - Tropical and infectious disease
  - Dangerous transportation
  - Hazardous activities
  - Limited health care resources

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## Foreign Travel Risk Factors

- ✦ Destination(s)
- ✦ Duration of trip
- ✦ Activities
- ✦ Health status
- ✦ Vaccinations
- ✦ Protection against insect bites
- ✦ Malaria prophylaxis



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## Traveler's Diarrhea

- ✦ Most common travel related illness
- ✦ Loose/watery stools, abdominal cramps, bloating, nausea, urgency, fever
- ✦ Sudden onset
- ✦ Duration usually less than 1 week
- ✦ May become chronic

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## Traveler's Diarrhea - Causes

- ✦ Typically acquired via ingestion of fecally contaminated food and/or water
- ✦ Undercooked meat & seafood
- ✦ Raw fruits & vegetables
- ✦ Water, ice, dairy products
- ✦ Inadequate personal hygiene practices

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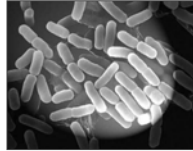
## Traveler's Diarrhea - Risk Factors

- ✦ Destination
- ✦ Duration of visit
- ✦ Complacency with prevention measures
- ✦ Street vendors > restaurants > home cooked meals
- ✦ Young travelers > old

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#### TD Biological Agents

- ✦ Enterotoxigenic Escherichia coli (ETEC)
  - ◆ Most common cause of TD worldwide
- ✦ Salmonella
- ✦ Shigella
- ✦ Campylobacter
- ✦ Vibrio
- ✦ Listeria

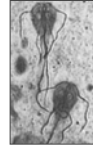


E. coli

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#### TD Biological Agents

- ✦ Norovirus
- ✦ Rotavirus
- ✦ Giardia lamblia
- ✦ Entamoeba histolytica
- ✦ Cryptosporidium
- ✦ Cyclospora



Giardia

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#### Travelers' Diarrhea - Prevention

- ✦ "Boil it, cook it, peel it or forget it!"
- ✦ Proper hand hygiene
- ✦ Safe fluids
  - ◆ Bottled water, juice, beer, soda
  - ◆ Hot coffee and tea
- ✦ Bismuth subsalicylate (Pepto-Bismol)
  - ◆ 60 cc or 2 tablets qid
- ✦ Prophylactic antibiotics not recommended

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#### Travelers' Diarrhea - Treatment

- ✦ Clear (safe) PO fluids
- ✦ Bismuth subsalicylate (Pepto-Bismol)
  - ◆ 30 cc or 1 tablet PO q 1 hour PRN
  - ◆ Maximum of 8 doses in 24 hours
- ✦ Loperamide (Immodium)
  - ◆ 4 mg PO, then 2 mg after each watery stool
  - ◆ Maximum of 8 tablets a day
- ✦ Atropine/diphenoxylate (Lomotil)
  - ◆ Two 0.025/2.5 mg tablets or 10 cc liquid PO qid

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#### Travelers' Diarrhea - Empiric RX

- ✦ Azithromycin 1 gm PO x 1 dose
- ✦ Levofloxacin 500 mg PO x 1 dose
- ✦ Cefixime 400 mg PO qd for 1-3 days
- ✦ Ciprofloxacin 500 mg PO bid for 1-3 days
- ✦ Ofloxacin 400 mg PO bid for 1-3 days

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#### Malaria

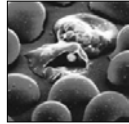
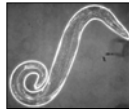
- ✦ 300-500 million cases each year worldwide
- ✦ 2-3 million deaths annually
- ✦ Caused by the Plasmodium protozoan parasite
- ✦ Transmitted by female Anopheles mosquito



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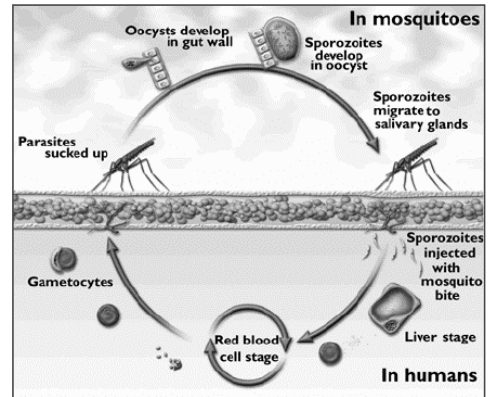
## Malaria Parasite

- ✦ *Plasmodium falciparum*
  - ◆ 40-60% of malaria
  - ◆ 95% of deaths
  - ◆ Chloroquine resistance
- ✦ *Plasmodium vivax*
  - ◆ 30-40% of cases
- ✦ *Plasmodium ovale*
  - ◆ West Africa
- ✦ *Plasmodium malariae*



*P. falciparum*

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## Malaria

### Symptoms

- ✦ Fever
- ✦ Chills
- ✦ Sweats
- ✦ Headache
- ✦ Myalgia
- ✦ Malaise

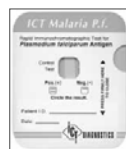
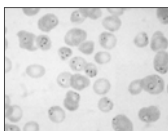
### Complications

- ✦ Anemia
- ✦ Hepatomegaly
- ✦ Splenomegaly
- ✦ Jaundice
- ✦ Renal failure
- ✦ Coma
- ✦ Death

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## Malaria Diagnosis

- ✦ Clinical signs & symptoms
- ✦ Thick & thin blood smears
- ✦ Antigen test kits



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## Malaria Prevention

- ✦ Risk awareness
- ✦ Protective clothing
- ✦ Mosquito netting
- ✦ N,N-diethylmetatoluamide (DEET)
- ✦ Permethrin
- ✦ Drug prophylaxis

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## Malaria Drug Prophylaxis

- Start 1-2 weeks prior to travel
- Continue for 4 weeks post travel
- Chloroquine (Aralen) 500 mg q week
- Hydroxy-chloroquine (Plaquenil) 400 mg q week
- Mefloquine (Lariam) 250 mg q week
- Doxycycline 100 mg qd

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## Malaria Drug Prophylaxis

- Atovaquone/proquanil (Malarone) 250/100 mg qd
  - Start 1 week pre-travel / continue for 1 week post travel
- Proquanil (Paludrine) 200 mg qd
  - Taken with weekly chloroquine
  - An alternative to mefloquine or doxycycline
- Primaquine 30 mg qd
  - To prevent relapse from *P.vivax* and *P.ovale*
  - Continue for 14 days post travel

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## Malaria Treatment

- Chloroquine 1 gm PO, 0.5 gm in 6 hours then 0.5 gm qd x 2 days *plus* primaquine 30 mg PO qd x 14 days for *P. vivax* or *P. ovale*.
- Quinine sulfate 650 mg PO tid *plus* doxycycline 100 mg PO bid x 7 days
- Pyrimethamine-sulfadoxine (Fansidar) 3 tablets, 75/1500 mg total single dose

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## SARS

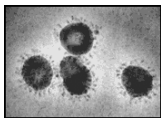
- Severe Acute Respiratory Syndrome
- The Emerging Disease of 2003*
- Origins in Guangdong Province, China



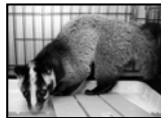
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## SARS-CoV

- Causative agent for SARS
- Coronavirus
- Inter-species transmission from civets



SARS-CoV



Civet

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## SARS Transmission

- Close person to person contact
- Respiratory droplets
- Contaminated environmental surfaces
- Aerosol
- Inhalation & mucous membrane contact

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## SARS Infection

- ✦ Incubation period of 2-10 days
- ✦ Fever > 38°C (100.4°F)
- ✦ Dry cough
- ✦ Dyspnea
- ✦ Chills, rigors, headache, myalgia, sore throat, rhinorrhea, diarrhea
- ✦ Pneumonia
- ✦ Acute Respiratory Distress Syndrome

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## SARS Surveillance

- ✦ Clinical signs & symptoms
- ✦ Travel to a suspect or confirmed SARS area within the previous 10 days
- ✦ Close contact with a suspect or confirmed SARS case within 10 days

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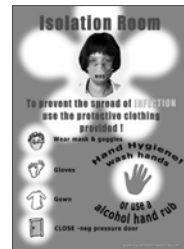
## SARS Diagnosis

- ✦ Positive surveillance criteria
- ✦ Diagnostic lab tests
  - ◆ RT-PCR
  - ◆ Enzyme immunoassay
  - ◆ SARS-CoV culture

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## SARS Treatment

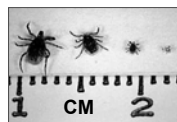
- ✦ Supportive care
- ✦ Steroids (?)
- ✦ Ribavirin (?)
- ✦ Interferon (?)
- ✦ Isolation
  - ◆ Respiratory
  - ◆ Droplet
  - ◆ Contact



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## Lyme Borreliosis

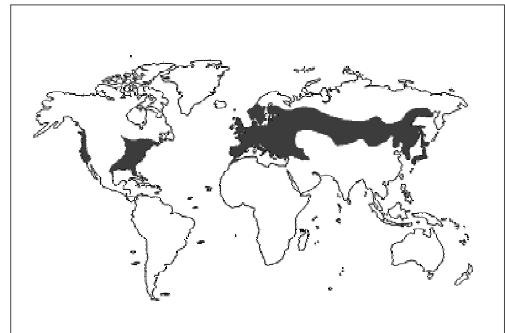
- ✦ Lyme Disease
- ✦ Caused by *Borrelia burgdorferi*
- ✦ Transmitted via *Ixodes* species ticks
- ✦ Reservoir hosts
  - ◆ White-footed mouse
  - ◆ White-tailed deer
  - ◆ Dusky-footed wood rat
  - ◆ Dogs, cats, birds, sheep, cattle, horses



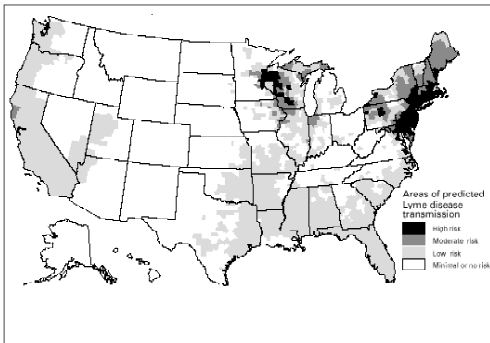
*Ixodes scapularis*

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## World-wide Distribution of Lyme Disease



#### Lyme Disease in the United States



#### Lyme Borreliosis - Prevention

- ✦ Risk awareness
- ✦ Avoidance of tick-prone environments
- ✦ Light colored protective clothing
- ✦ Daily body surface examination for ticks
- ✦ N,N-diethylmetatoluamide (DEET)
- ✦ Permethrin

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#### Lyme Borreliosis – Stage 1

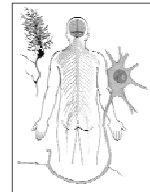
- ✦ Ixodes bite/feeding
  - ◆ Inoculation requires 1-2 days of attachment
- ✦ 7-14 days incubation period
- ✦ Erythema Migrans (Bull's-Eye Rash)
- ✦ Fever, headache, myalgia, arthralgia, fatigue



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#### Lyme Borreliosis – Stage 2

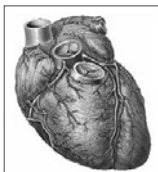
- ✦ Early disseminated phase
- ✦ Weeks to months after inoculation
- ✦ Neurologic manifestations
  - ◆ Facial palsy
  - ◆ Aseptic meningitis
  - ◆ Encephalitis
  - ◆ Radiculoneuritis
  - ◆ Neuropsychiatric disturbances



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#### Lyme Borreliosis – Stage 2

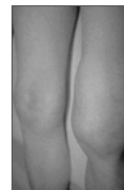
- ✦ Cardiac manifestations
  - ◆ Atrioventricular heart block
  - ◆ Pericarditis
  - ◆ Myocarditis
  - ◆ Cardiomyopathy



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#### Lyme Borreliosis – Stage 3

- ✦ Late disseminated phase
- ✦ Months to years after inoculation
- ✦ Progressive arthralgia
- ✦ Arthritis



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#### Lyme Borreliosis - Diagnosis

- ✦ Clinical signs & symptoms
- ✦ Enzyme immunoassay
- ✦ Indirect fluorescent antibody
- ✦ Western immunoblot

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#### Lyme Borreliosis - Treatment

- ✦ Prophylaxis
  - ◊ Doxycycline 200 mg PO
- ✦ Early RX- Erythema Migrans
  - ◊ Doxycycline 100 mg PO bid x 14-21 days
  - ◊ Amoxicillin 500 mg PO tid x 14-21 days
  - ◊ Cefuroxime 500 mg PO bid x 14-21 days
  - ◊ Erythromycin 250 mg PO qid x 14-21 days

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#### Lyme Borreliosis - Treatment

- ✦ Later RX - Arthritis
  - ◊ Doxycycline 100 mg PO bid x 30-60 days
  - ◊ Amoxicillin 500 mg PO qid x 30-60 days
  - ◊ Ceftriaxone 2 gm IV qd x 14-28 days
  - ◊ Penicillin 20-24 mU IV qd x 14-28 days

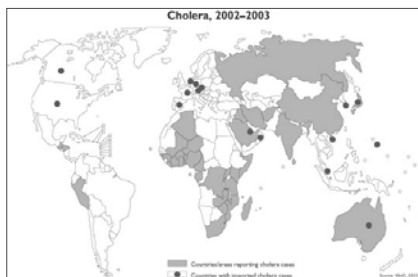
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#### Lyme Borreliosis - Treatment

- ✦ Later RX - CNS
  - ◊ Ceftriaxone 2 gm IV qd x 14-28 days
  - ◊ Penicillin 20-24 mU IV qd x 14-28 days
- ✦ Later RX - Carditis
  - ◊ Ceftriaxone 2 gm IV qd x 14-28 days
  - ◊ Penicillin 20-24 mU IV qd x 14-28 days
  - ◊ If only first degree AV block, may consider:
    - ◊ Doxycycline 100 mg PO bid x 14-21 days
    - ◊ Amoxicillin 500 mg PO tid x 14-21 days

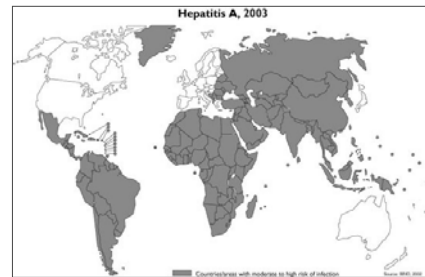
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#### Vaccine Preventable Disease



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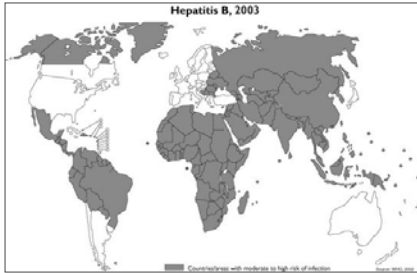
#### Vaccine Preventable Disease



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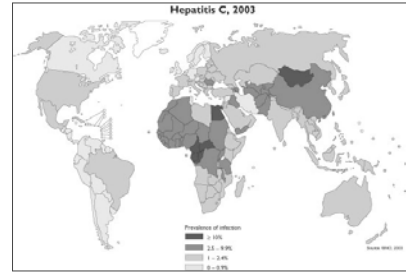
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**Vaccine Preventable Disease**



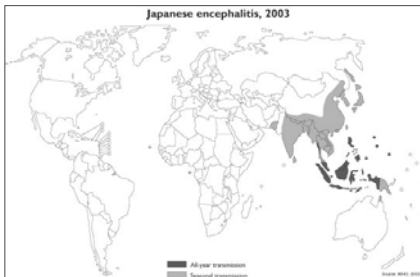
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**Hepatitis C**



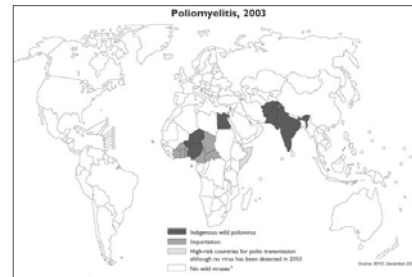
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**Vaccine Preventable Disease**



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**Vaccine Preventable Disease**



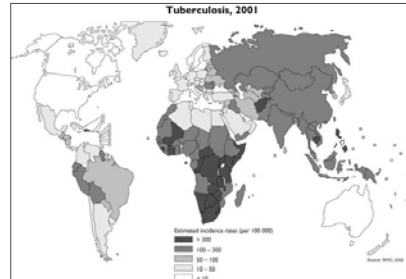
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**Vaccine Preventable Disease**



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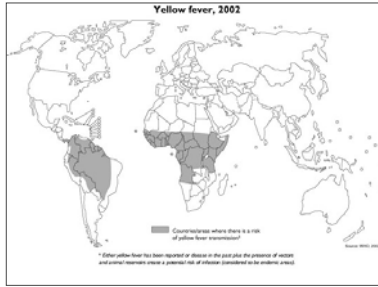
**Vaccine Preventable Disease (?)**



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## Vaccine Preventable Disease



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## Vaccines Routine Immunizations

- ✦ DTP
- ✦ MMR
- ✦ Polio
- ✦ Influenza
- ✦ Pneumococcus
- ✦ H. influenza b
- ✦ Varicella



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## Vaccines Recommended per destination(s)

- ✦ Hepatitis A, B
- ✦ Immune globulin
- ✦ Meningococcus
- ✦ Japanese encephalitis
- ✦ Plague
- ✦ Rabies
- ✦ Tick-borne encephalitis
- ✦ Tuberculosis (?)
- ✦ Typhoid fever

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## Vaccines Required per destination(s)

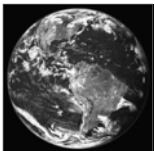
✦ Yellow fever

✦ Cholera



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## Travel Preparation & Disease Prevention



- ✦ Destination research
- ✦ Disease awareness
- ✦ Health status
- ✦ Disease prophylaxis
- ✦ Medical & travel insurance
- ✦ Travel medical kit

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## Post-travel Illness

- ✦ Fever
- ✦ Cough
- ✦ Chills
- ✦ Diarrhea
- ✦ Nausea/vomiting
- ✦ Abdominal pain
- ✦ Weight loss
- ✦ Fatigue
- ✦ Rash
- ✦ Myalgia/arthritis

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# Travel Related Infectious Disease

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## Travel Medicine Resources

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- ✦ Health Information for International Travel 2003-2004 (The Yellow Book); CDC
- ✦ International Travel and Health 2004  
WHO
- ✦ Textbook of Travel Medicine and Health  
Herbert L. Dupont, MD and Robert Steffen, MD
- ✦ The Travel and Tropical Medicine Manual  
Elaine Jong, MD and Russell McMullen, MD
- ✦ Wilderness Medicine  
Paul S. Auerbach, MD

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## Travel Medicine Resources

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- ✦ Centers for Disease Control  
[www.cdc.gov](http://www.cdc.gov)
- ✦ Health Canada  
[www.hc-sc.gc.ca](http://www.hc-sc.gc.ca)
- ✦ International Society of Travel Medicine  
[www.istm.org](http://www.istm.org)
- ✦ World Health Organization  
[www.who.int](http://www.who.int)

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**Travel widely...but travel wisely.**

ISTM

## For additional information:

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