

YERSINIA PESTIS

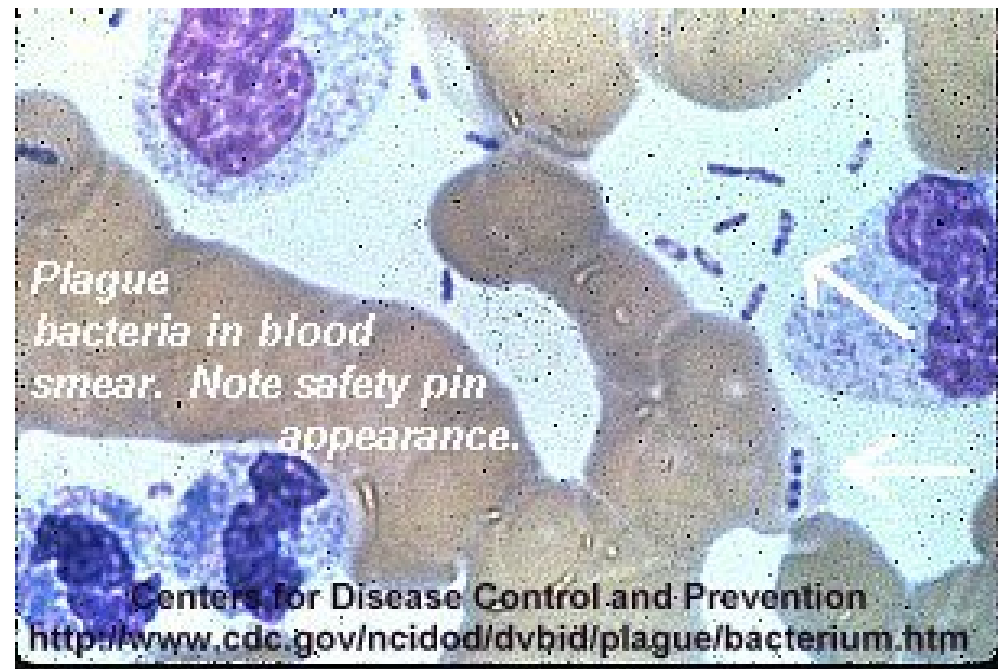
Plague

Yersinia pestis

- In the sixth century killed 100 million people
- The last pandemic occurred in the late 1800s primarily by rat infested ships

Yersinia pestis

- Tiny gram negative rods
- Unusual bipolar staining and capsules
- Formerly *pasteurella pestis*



Yersinia pestis

- Virulence factors;
 - capsular and envelope proteins
 - coagulase
 - endotoxin
 - highly potent murine toxin

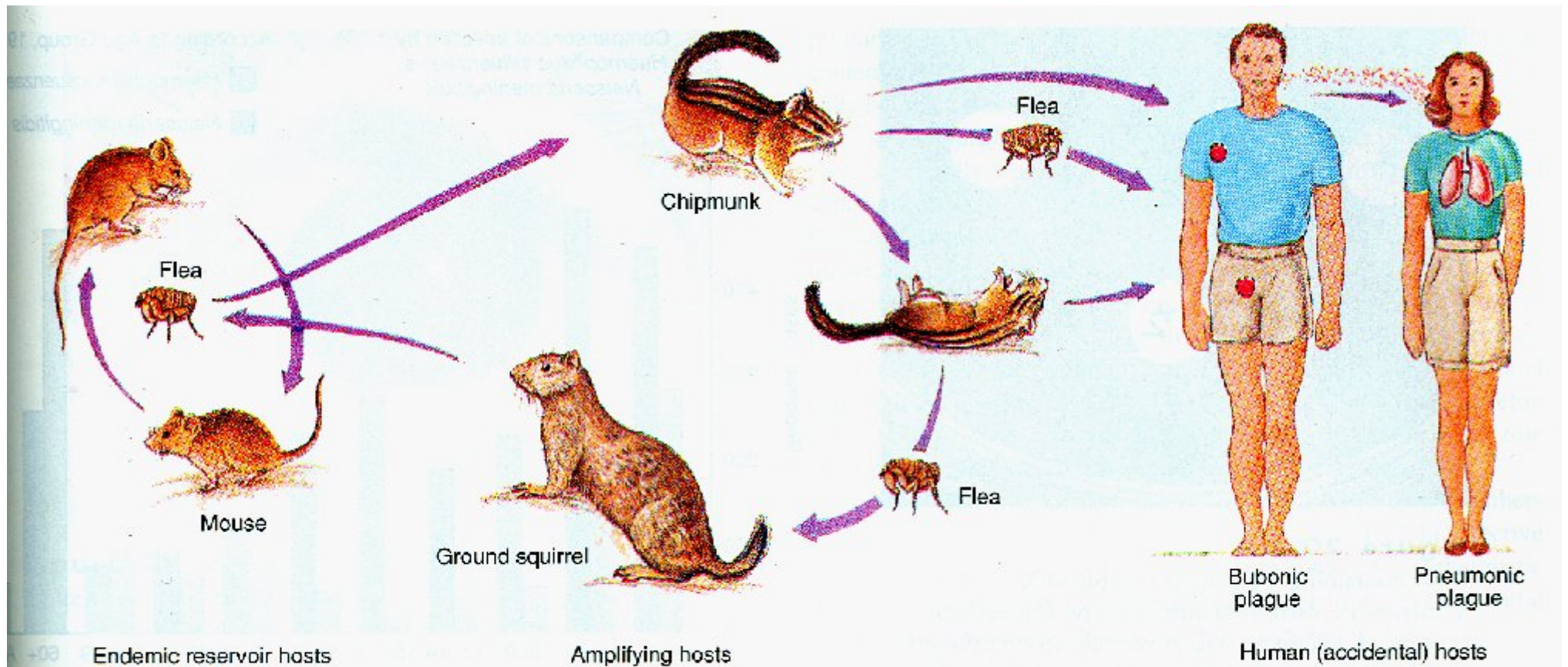
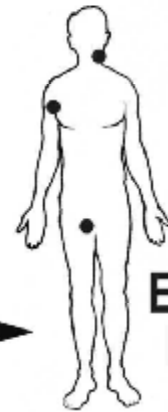
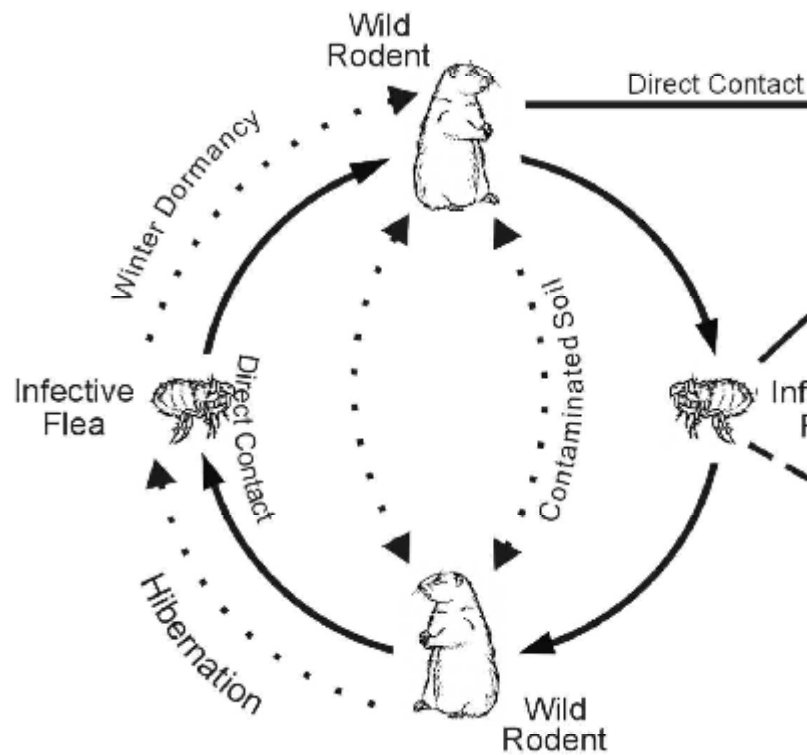


Figure 20.19

The infection cycle of *Y. pestis*, simplified for clarity.

Sylvatic Cycle



Bubonic Plague



Secondary Plague Pneumonia



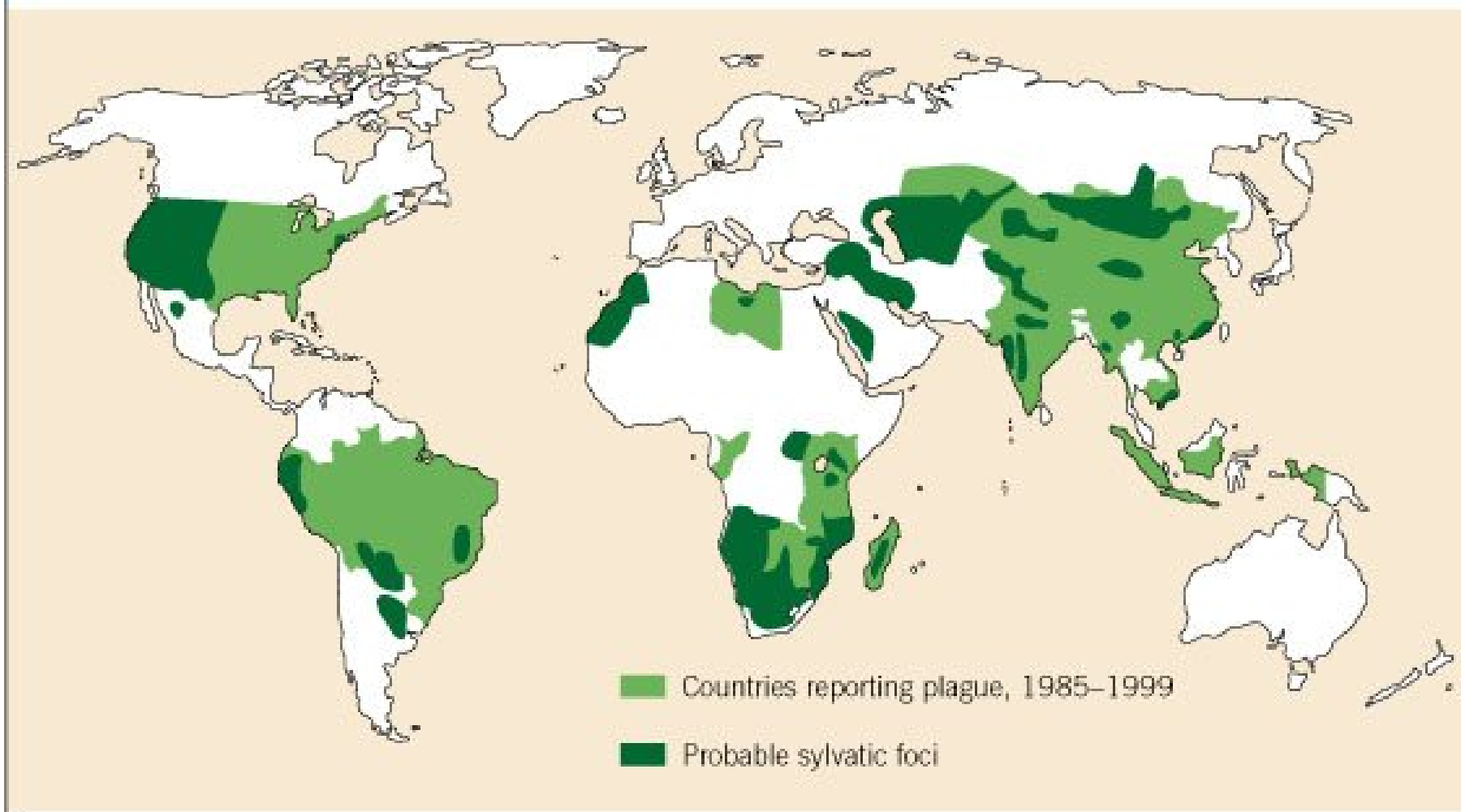
Pneumonic Plagu Epidemic



Urban Cycle

Pathways	
	Usual
	Occasional
	Rare or theoretical

GLOBAL DISTRIBUTION OF PLAGUE



Yersinia pestis

- Pathology
 - ID 3-50 cells
 - Bubonic plague
 - Septicemic plague
 - Pneumonic plague

Yersinia pestis

- Bubonic plague:
 - incubation period 2 to 8 days
 - bubo(necrosis and swelling of lymph node)
 - groin and axilla and neck
 - fever, chills, headache, nausea, weakness
 - and tenderness of the bubo



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Yersinia pestis

- Septicemic plague:
 - disseminated intravascular coagulation
 - subcutaneous hemorrhage
 - purpura that may degenerate into necrosis and gangrene
 - Black death

Yersinia pestis

- Pneumonic plague
 - localization in the lungs
 - highly contagious through sputum and aerosols

Yersinia pestis

- Diagnosis, treatment and prevention:
 - death into 2 to 4 days of symptoms
 - prompt diagnosis and treatment
 - patient history, symptoms and laboratory diagnosis from bubo aspirates
 - tetracyclin, streptomycin and chloramphenicol

TREATMENT GUIDELINES FOR PLAGUE

Drug		Dosage	Route of administration
Streptomycin	Adults	1g q12h	im
	Children	15mg/kg q12h*	im
Gentamicin	Adults	1–1.5mg/kg q8h [†]	im or iv
	Children	2.0–2.5mg/kg q8h	im or iv
	Infants/neonates	2.5mg/kg q8h	im or iv
Tetracycline	Adults	0.5g q6h	po
	Children >8 years old	6.25–12.5mg/kg q6h	po
Doxycycline	Adults	100mg q12h	po or iv
	Children >8 years old and >45kg	100mg q12h	po or iv
	Children >8 years old and <45kg	2.2mg/kg q12h	po or iv
Chloramphenicol	Adults	12.5mg/kg q6h [‡]	po or iv
	Children >1 year old	12.5mg/kg q6h [‡]	po or iv

* Not to exceed 2g/day

[†] Daily dose should be reduced to 3mg/kg as soon as clinically indicated

[‡] Up to 100mg/kg per day initially. Dosage should be adjusted to maintain plasma concentrations at 5–20µg/ml. Hematologic values should be monitored closely

- One of internationally quarantinable disease (cholera, small pox, yellow fever)
- Killed attenuated vaccine is given to military personnel, veterinarians, and laboratory workers.
- Protection for few months

REPORTED CASES OF PLAGUE IN HUMANS BY COUNTRY (1985–99)			
Region	Country	Number of cases	Number of deaths
Africa	Botswana	173	12
	Congo	3008	607
	Kenya	44	8
	Madagascar	9650	795
	Malawi	665	15
	Mozambique	1787	28
	Namibia	2865	110
	Tanzania	6646	478
	Uganda	556	61
	Zambia	320	27
	Zimbabwe	418	35
	Total	26,132	2176
	Americas	Bolivia	135
Brazil		293	6
Ecuador		17	16
Peru		1436	74
USA		144	14
Total		2025	132
Asia	China	361	53
	India	876	54
	Indonesia	6	0
	Kazakhstan	18	6
	Laos	10	0
	Mongolia	82	30
	Myanmar	815	6
	Vietnam	3623	196
	Total	5791	345
World totals		33,948	2653