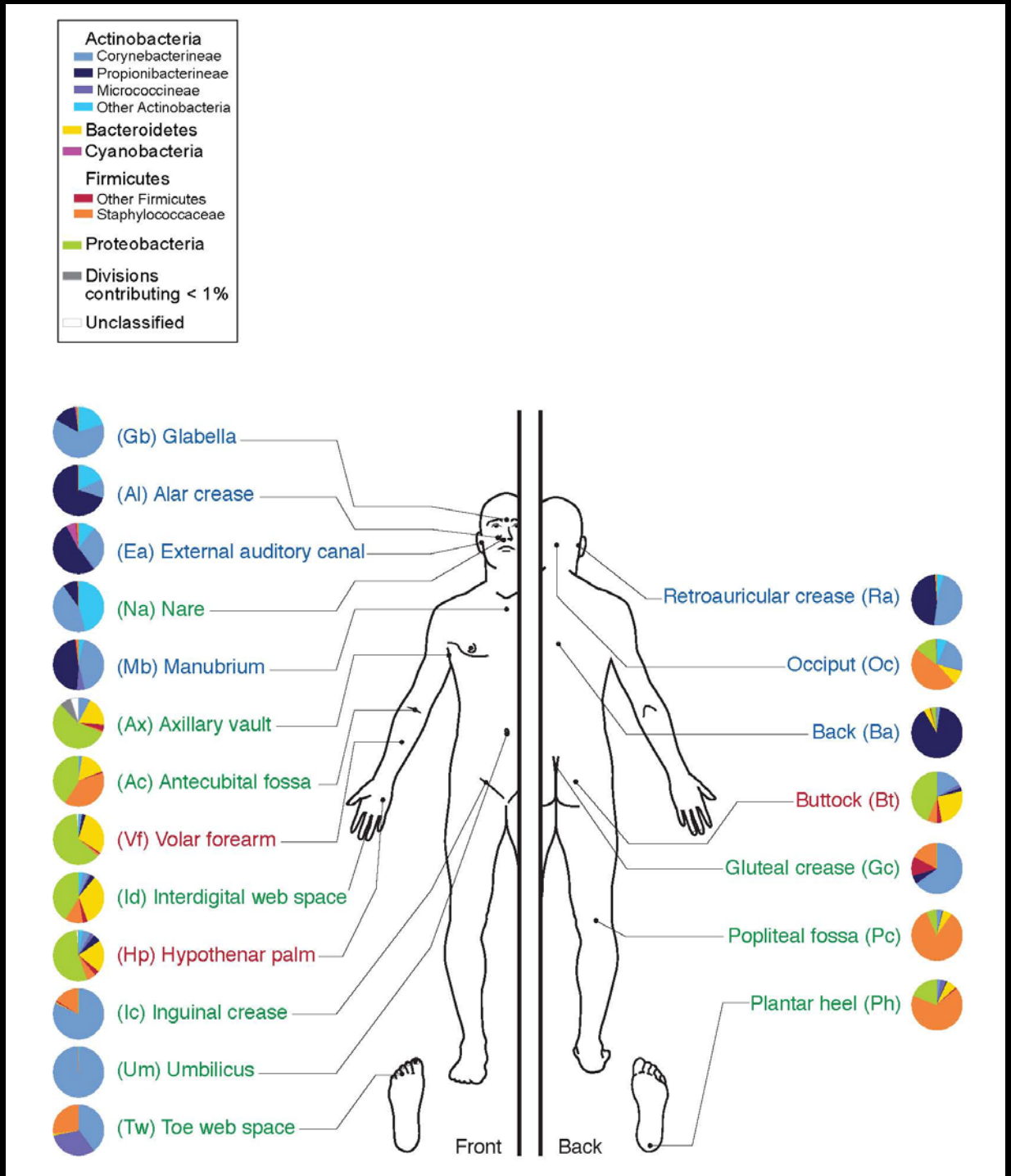
Principles of Disease and Epidemiology

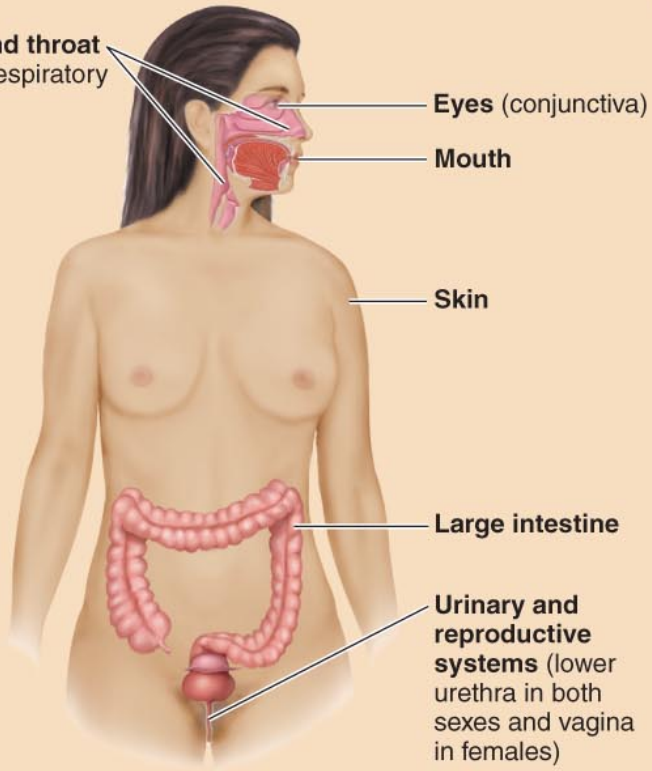
Normal Microbiota



Normal Microbiota

Table 14.1 Representative Normal Microbiota by Body Region

Region	Principal Components	Comments
Skin	*Propionibacterium, Staphylococcus, Corynebacterium, Micrococcus, Acinetobacter, Brevibacterium; Pityrosporum* (fungus), *Candida* (fungus), *Malassezia* (fungus)	▪ Most of the microbes in direct contact with skin do not become residents because secretions from sweat and oil glands have antimicrobial properties. ▪ Keratin is a resistant barrier, and the low pH of the skin inhibits many microbes. ▪ The skin also has a relatively low moisture content.
Eyes (Conjunctiva)	*Staphylococcus epidermidis, S. aureus,* diphtheroids, *Propionibacterium, Corynebacterium*, streptococci, *Micrococcus*	▪ The conjunctiva, a continuation of the skin or mucous membrane, contains basically the same microbiota found on the skin. ▪ Tears and blinking also eliminate some microbes or inhibit others from colonizing.



Normal Microbiota

Table 14.1 (continued)

Region	Principal Components	Comments
Nose and Throat (Upper Respiratory System)	*Staphylococcus aureus, S. epidermidis,* and aerobic diphtheroids in the nose; *S. epidermidis, S. aureus,* diphtheroids, *Streptococcus pneumoniae, Haemophilus,* and *Neisseria* in the throat	▪ Although some normal microbiota are potential pathogens, their ability to cause disease is reduced by microbial antagonism. ▪ Nasal secretions kill or inhibit many microbes, and mucus and ciliary action remove many microbes.
Mouth	*Streptococcus, Lactobacillus, Actinomyces, Bacteroides, Veillonella, Neisseria, Haemophilis, Fusobacterium, Treponema, Staphylococcus, Corynebacterium,* and *Candida* (fungus)	▪ Abundant moisture, warmth, and the constant presence of food make the mouth an ideal environment that supports very large and diverse microbial populations on the tongue, cheeks, teeth, and gums. ▪ However, biting, chewing, tongue movements, and salivary flow dislodge microbes. Saliva contains several antimicrobial substances.
Large Intestine	*Escherichia coli, Bacteroides, Fusobacterium, Lactobacillus, Enterococcus, Bifidobacterium, Enterobacter, Citrobacter, Proteus, Klebsiella, Candida* (fungus)	▪ The large intestine contains the largest numbers of resident microbiota in the body because of its available moisture and nutrients. ▪ Mucus and periodic shedding of the lining prevent many microbes from attaching to the lining of the gastrointestinal tract, and the mucosa produces several antimicrobiol chemicals. ▪ Diarrhea also flushes out some of the normal microbiota.
Urinary and Reproductive Systems	*Staphylococcus, Micrococcus, Enterococcus, Lactobacillus, Bacteroides*, aerobic diphtheroids, *Pseudomonas, Klebsiella,* and *Proteus* in urethra; lactobacilli, *Streptococcus, Clostridium, Candida albicans* (fungus), and *Trichomonas vaginalis* (protozoan) in vagina	▪ The lower urethra in both sexes has a resident population; the vagina has its acid-tolerant population of microbes because of the nature of its secretions. ▪ Mucus and periodic shedding of the lining prevent microbes from attaching to the lining; urine flow mechanically removes microbes, and the pH of urine and urea are antimicrobial. ▪ Cilia and mucus expel microbes from the cervix of the uterus into the vagina, and the acidity of the vagina inhibits or kills microbes.

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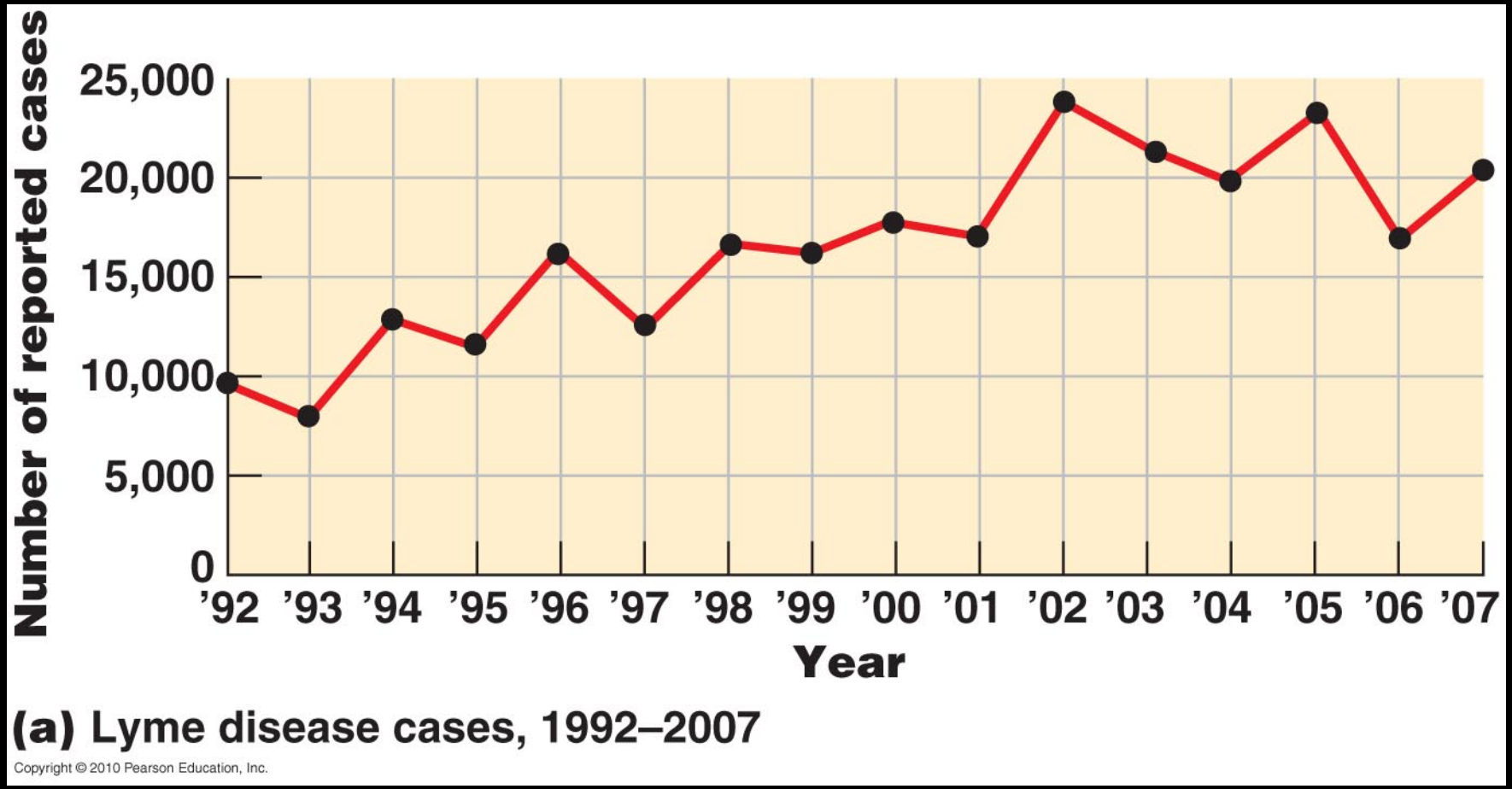
Terminology

Table 14.2 Selected Zoonoses

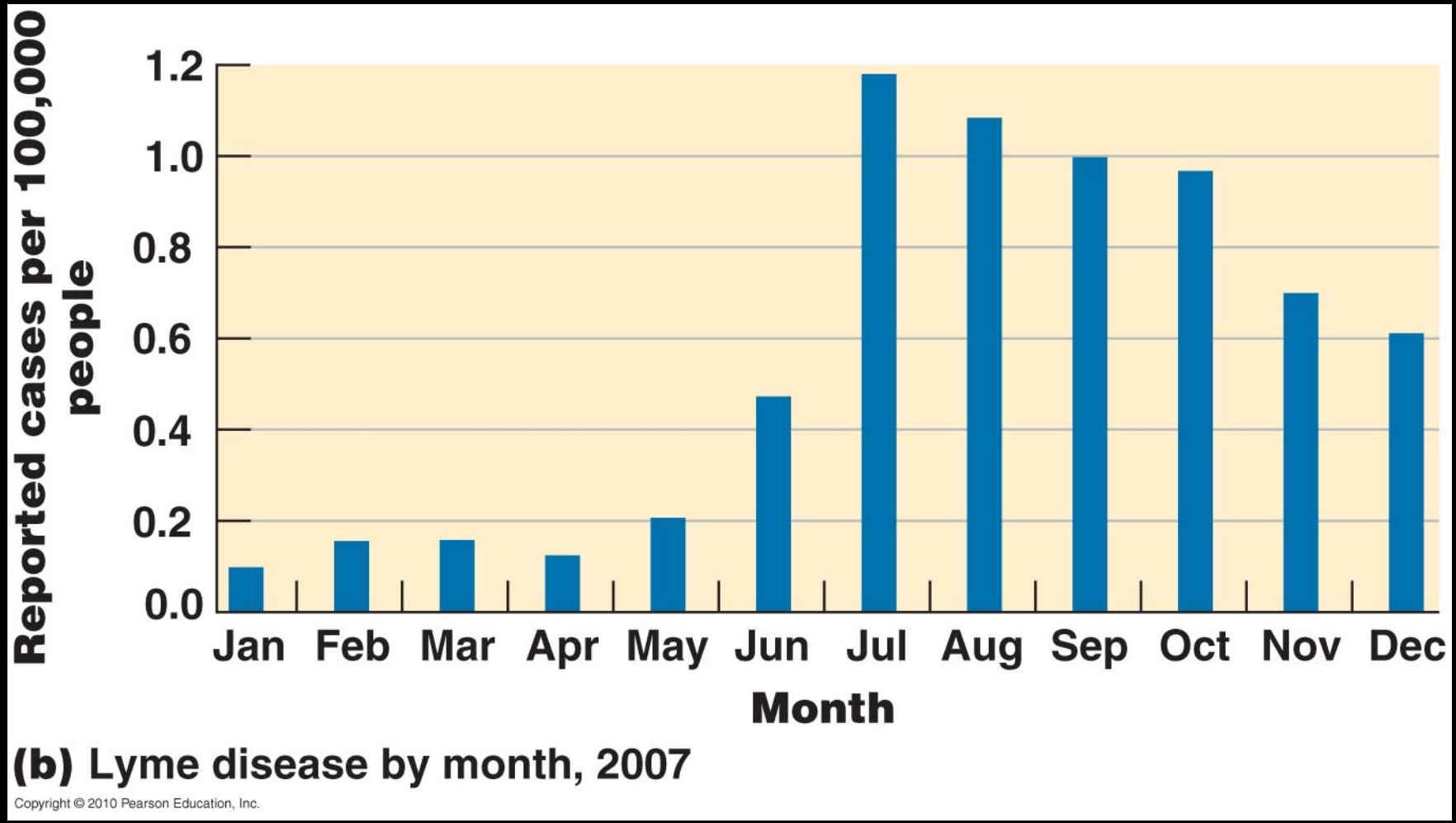
Disease	Causative Agent	Reservoir	Transmission Due To	Chapter Reference
Viral				
Influenza (some types)	*Influenzavirus*	Swine, birds	Direct contact	24
Rabies	*Lyssavirus*	Bats, skunks, foxes, dogs, raccoons	Direct contact (bite)	22
West Nile encephalitis	*Flavivirus*	Horses, birds	*Aedes* and *Culex* mosquito bite	22
Hantavirus pulmonary syndrome	*Hantavirus*	Rodents (primarily deer mice)	Direct contact with rodent saliva, feces, or urine	23
Bacterial				
Anthrax	*Bacillus anthracis*	Domestic livestock	Direct contact with contaminated hides or animals; air; food	23
Brucellosis	*Brucella* spp.	Domestic livestock	Direct contact with contaminated milk, meat, or animals	23
Plague	*Yersinia pestis*	Rodents	Flea bites	23
Cat-scratch disease	*Bartonella henselae*	Domestic cats	Direct contact	23
Ehrlichiosis	*Ehrlichia* spp.	Deer, rodents	Tick bites	23
Leptospirosis	*Leptospira*	Wild mammals, domestic dogs and cats	Direct contact with urine, soil, water	26
Lyme disease	*Borrelia burgdorferi*	Field mice	Tick bites	23
Psittacosis (ornithosis)	*Chlamydophila psittaci*	Birds, especially parrots	Direct contact	24
Rocky Mountain spotted fever	*Rickettsia rickettsii*	Rodents	Tick bites	23
Salmonellosis	*Salmonella enterica*	Poultry, reptiles	Ingestion of contaminated food and water and putting hands in mouth	25
Endemic typhus	*Rickettsia typhi*	Rodents	Flea bites	23
Fungal				
Ringworm	*Trichophyton* *Microsporum* *Epidermophyton*	Domestic mammals	Direct contact; fomites (nonliving objects)	21
Protozoan				
Malaria	*Plasmodium* spp.	Monkeys	*Anopheles* mosquito bite	23
Toxoplasmosis	*Toxoplasma gondii*	Cats and other mammals	Ingestion of contaminated meat or by direct contact with infected tissues or fecal matter	23
Helminthic				
Tapeworm (pork)	*Taenia solium*	Pigs	Ingestion of undercooked contaminated pork	25
Trichinellosis	*Trichinella spiralis*	Pigs, bears	Ingestion of undercooked contaminated pork	25

Graphs



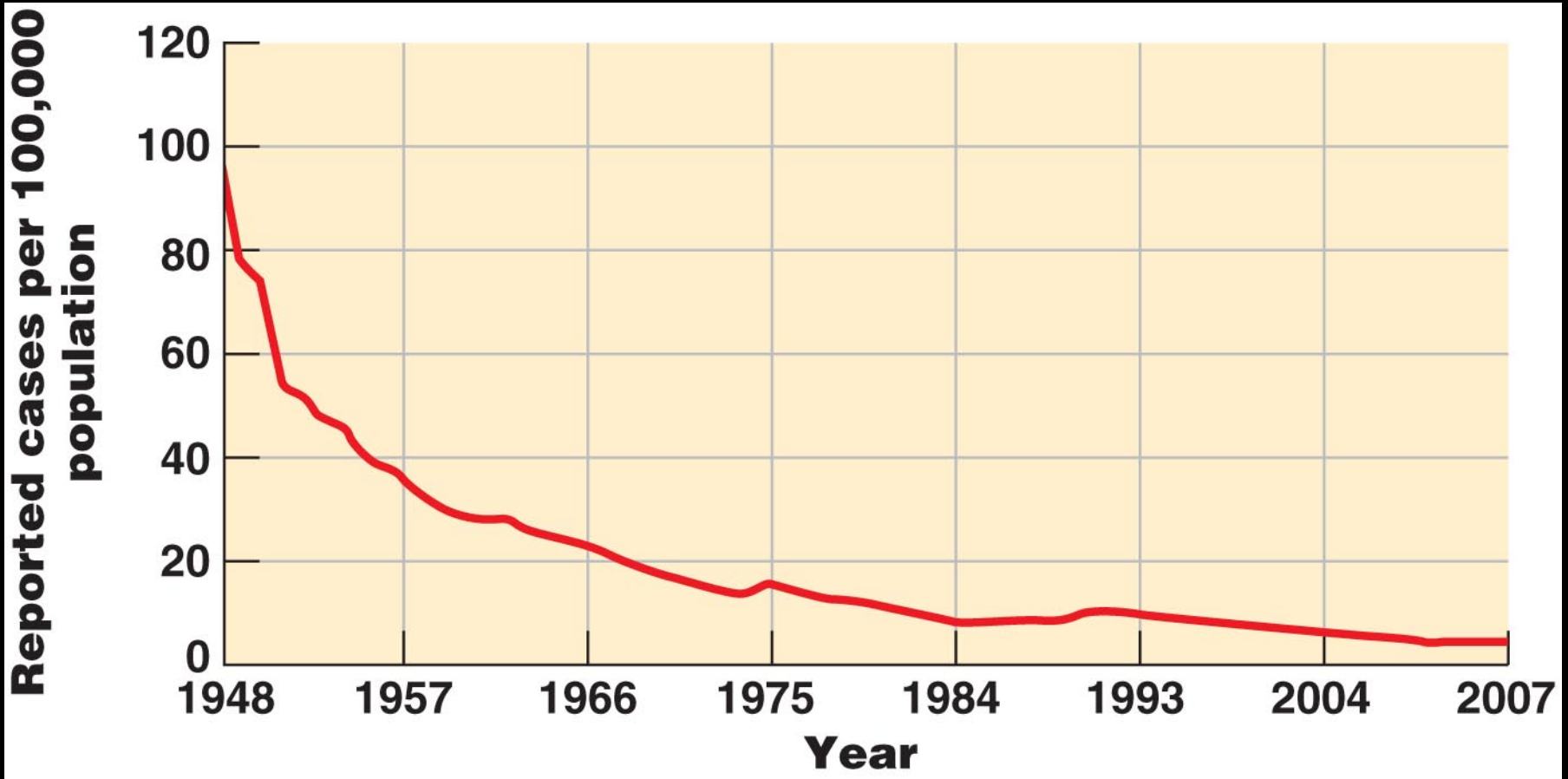
(a) Lyme disease cases, 1992–2007

Graphs



(b) Lyme disease by month, 2007

Graphs



(c) Reported tuberculosis cases, 1948–2007

Graphs