Other Organisms

Aeromonas hydrophila, Aeromonas veronii, and *Aeromonas schubertii* are gram-negative rods found in salt and fresh water. They may cause mild to severe wound infections after injury, producing cellulitis, myonecrosis, and rhabdomyolysis. Necrotizing fasciitis has been reported with *A. veronii* and *A. schubertii* infections. *Aeromonas* wound infections have also been reported as a result of the medicinal use of leeches.

Arcanobacterium haemolyticum is a gram-positive, weakly acid-fast bacillus. It has been isolated from soft tissue infections, including chronic ulcers, cellulitis, and paronychia.

Bacillus anthracis is a gram-positive bacillus that forms spores. Transdermal inoculation of the spores from even incidental trauma can result in cutaneous anthrax. It manifests initially as a small, pruritic papule that becomes surrounded by painless, nonpurulent vesicles that easily rupture, leaving a black eschar at the base of the ulceration. Uncomplicated disease heals without scar formation in 1 to 3 weeks. Serious cutaneous disease is marked by extensive edema, worsening inflammation, and toxemia (Fig. 94-4).

Bartonella henselae is a gram-negative bacillus that causes cat-scratch disease. Between 3 and 10 days after a bite or scratch from a cat or other vector, a tender, erythematous papule appears. Lymphadenopathy ipsilateral to the site of inoculation occurs 1 to 3 weeks later, and the patient typically experiences constitutional symptoms. The lymphadenopathy may take months to resolve.

Capnocytophaga canimorsus is a thin, gram-negative bacillus with tapered ends. It is strongly associated with dog (primarily) and cat bites and scratches. Asplenic patients are at particular risk for sepsis due to this organism.

Clostridium perfringens is an anaerobic, large, gram-positive rod. It can cause cellulitis or life-threatening necrotizing infections of skin, muscle, and other soft tissues. The latter is characterized by rapidly progressive tissue destruction, gas in tissues, shock, and death. Conditions such as trauma or illicit drug injection produce anaerobic tissue conditions that favor the organism. The condition can also develop in patients with bowel carcinoma or neutropenia. Gram stain of tissue or exudate reveals large, gram-positive rods and no inflammatory cells.

Edwardsiella tarda is a gram-negative rod found in fresh water environments. It is associated with wound infections, abscesses, and bacteremia. The mortality rate is high among patients with liver disease and iron overload.

Eikenella corrodens is a gram-negative bacillus that is part of the normal human oral flora. It is an important pathogen in human bite wounds, closed-fist injuries, and infections seen in chronic finger or nail biters. Severe soft tissue infection may occur, leading to septic arthritis and osteomyelitis.

Erysipelothrix rhusiopathiae is a gram-positive rod, but it may appear as gram-negative because of rapid decolorization. Its major reservoir is in domestic swine, and infection occurs by direct cutaneous contact through a cut or abrasion. Disease is characterized as erysipeloid (i.e., subacute cellulitis with vesiculation), as a diffuse cutaneous eruption with systemic symptoms, or as bacteremia that is often associated with endocarditis.

Francisella tularensis is a gram-negative coccobacillus found in rabbits, hares, hamsters, and rodents. Ulceroglandular tularemia occurs 3 to 5 days after humans are inoculated cutaneously during contact with any of these species. A papule is formed initially, followed by ulceration with enlargement of the regional lymph nodes. Vesicles may be seen. If left untreated, the ulcer remains for weeks before healing, leaving a residual scar. Suppuration of the affected lymph nodes is the most common complication, occurring despite appropriate treatment (Fig. 94-5). *B. anthracis* and *F. tularensis* have been used as agents in bioterrorism.

Cryptococcus neoformans, Candida albicans, Histoplasma capsulatum, Blastomyces dermatitidis, Coccidioides immitis, and opportunistic fungi can have skin manifestations. Opportunistic fungi, including *Aspergillus* species, fungi in the order Mucorales, and *Fusarium* species, can infect the skin of immunocompromised patients. Skin manifestations of fungal infections include papules, nodules, circumscribed erythematous lesions, ulcers, verrucous lesions, and eschars.

FIGURE 94-4 Cutaneous anthrax lesion on the skin of the forearm caused by the bacterium *Bacillus anthracis*. (From Centers for Disease Control and Prevention: Public health image library. Available at http://phil.cdc.gov/Phil/home.asp. Accessed October 31, 2014.)

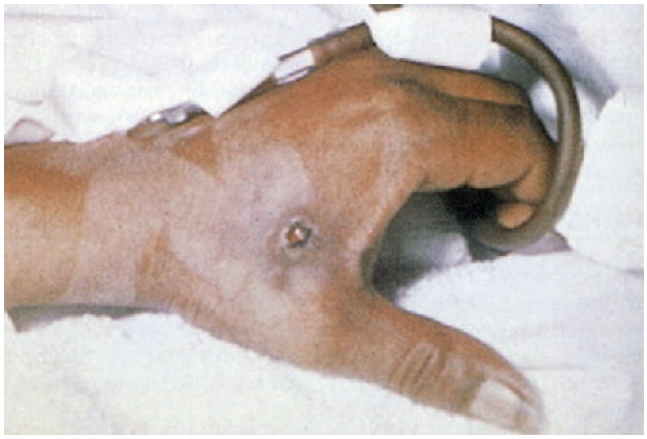

FIGURE 94-5 Tularemic ulcer with eschar formation after percutaneous inoculation of *Francisella tularensis*. (From Beard CB, Dennis DT: Tularemia. In Cohen J, Powderly WG, Opal SM, editors: Infectious diseases, ed 3, London, 2010, Mosby.)