SECTION III

. . .that he may be able to look after his workmen, that they do not meet with those diseases to which they are more liable than workmen in other occupations, or if they do meet with them, that he himself may be able to heal them or may see that the doctors do so.

—Agricola

BIOLOGICAL HAZARDS

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Biological hazards include acute and chronic infections, parasitism, and toxic and allergic reactions to plant and animal agents. Infections may be caused by bacteria, viruses, rickettsia, chlamydia, or fungi. Parasitism may involve protozoa, helminths, or arthropods. Many of the occupational diseases are zoonoses and, consequently, agricultural or other workers associated with animals may be at risk. Some of the infectious or parasitic diseases are transmitted by parasitic arthropod species which act as an intermediate host or vector.

A spectrum of plants and animals produce irritating, toxic, or allergenic substances. Dusts may contain many kinds of allergenic materials, including insect scale, hairs, and fecal dust, sawdusts, plant pollens, and fungal spores.

Biological hazards which will not be discussed in detail include bites or attacks by domestic and wild animals. Divers occasionally encounter sharks or other dangerous fish, sea snakes, or other venomous sea animals. In some areas, risk of occupational exposure to bites from venomous snakes or insects is considerable.

Outdoor occupations that deal with plants or animals or their products, or with food and food processing are more likely to expose the worker to biological hazards. Laboratory and hospital personnel may also be exposed to biological hazards. Travel and work in new environments by previously unexposed and susceptible groups or individuals increase the risk of contracting endemic diseases.

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VIRAL DISEASES

Viral diseases likely to be encountered occupationally include animal respiratory viruses, poxviruses, enteroviruses, and arboviruses. Infections may be acquired from the vector or from the handling of animals or animal products in agriculture. Laboratory-acquired infections

may result from working with the agent, from accidents, from animals, from clinical or autopsy specimens, from aerosols, or from glassware. Viral transmission may occur among patients and staff of hospitals.

RABIES

POTENTIAL OCCUPATIONAL EXPOSURES

At special risk to this viral disease are veterinarians, wild animal handlers, and cave explorers; but the risk remains for farmers, ranchers, trappers, and those individuals who are involved with dogs and cats of unknown origin and for delivery personnel.

SYNONYMS

Hydrophobia

ROUTE OF ENTRY

This disease is transmitted to man by bites of rabid domestic or wild animals (1). In the U.S.A., the principal reservoir which presents a threat to man consists of four wild species: the skunk, the fox, the bat, and raccoon.

HARMFUL EFFECTS

Local—

None except secondary infection at the site of the bite wound.

Systemic—

This viral disease is an almost invariably fatal acute encephalitis. Characteristic prodromal signs and symptoms include headache, anorexia, nausea, and fever. Exaggerated sympathetic responses, drooling, and hydrophobia are typical in the later sensory stages. Death usually occurs following convulsions of the excitement phase, but occasionally occurs in a comatose paralytic stage.

PREVENTIVE MEASURES

Rabies is caused by a virus of the rhabdovirus group and requires an incubation period usually from a few weeks to several months, but occasionally up to one year. Prevention of the disease is accomplished by avoidance of animal bites and caves containing infected bats; vaccination of domestic pets and farm animals; post-exposure immunization; and, in certain high-risk individuals, pre-exposure immunization as appropriate (2,3,4).

REFERENCES

1. World Health Organization. 1966. W.H.O. Expert Committee on Rabies, Fifth Report. Technical Report Series No. 321. World Health Organization, Geneva.
2. Plotkin, S. A., and H. F. Clark. 1971. Prevention of rabies in man. J. Infect. Dis. 123:227.
3. Bahmanyar, M., A. Fayaz, S. Nour-Salehi, M. Mohammadi, and H. Koprowski. 1976. Successful protection of humans exposed to rabies infection. J. Amer. Med. Assoc. 236:2751.
4. Garner, W. R., D. O. Jones, and E. Pratt. 1976. Problems associated with rabies pre-exposure prophylaxis. J. Am. Med. Assoc. 235:1131.

CAT-SCRATCH DISEASE

POTENTIAL OCCUPATIONAL EXPOSURES

Presumably this disease is a viral infection, but it has been suggested that the causative agent may be of the chlamydia type. Principal occupations at risk are workers in animal laboratories, cat and dog handlers, and veterinarians (1).

SYNONYMS

Cat-scratch fever, non-bacterial regional lymphadenitis, benign inoculation lymphoreticulosis.

ROUTE OF ENTRY

The route of entry is a break in the skin from a cat scratch or from sharp objects such as thorns or splinters.

HARMFUL EFFECTS

Local—

Papule or pustule at the primary site of inoculation and occasionally a transient macular or vesicular rash constitute the primary local effects.

Systemic—

Regional lymphadenitis, which occasionally suppurates, develops up to three weeks following inoculation. Other symptoms, headache, malaise, and fever, are typically mild. The disease itself is self-limiting and without sequelae, but can be confused with granulomatous or neoplastic disease. Diagnosis can be established by skin-testing and/or biopsy to rule out tumor.

PREVENTIVE MEASURES

Proper and immediate attention to scratches is a prerequisite to prevention.

REFERENCE

1. Grieseme, R. A., and L. G. Wolfe. 1971. Cat-scratch disease. J. Am. Vet. Med. Assoc. 158:1008.

ORF

POTENTIAL OCCUPATIONAL EXPOSURES

At high risk to this disease are shepherds, stockyard workers, shearers and veterinarians who come in contact with sheep and goats (1).

SYNONYMS

Ecthyma infectiosum, ecthyma contagiosum.

ROUTE OF ENTRY

Virus enters through small breaks in the skin usually on the hand or exposed parts of the body. The pustular lesion develops at the site of entry. Reservoir is sheep and goats.

HARMFUL EFFECTS

Local—

Apart from the pustular lesion at site of entry, there are no local effects.

Systemic—

The systemic effects of the disease are very mild, and usually consist of a mild fever and mild regional lymphangitis and lymphadenitis. The disease is self-limiting in man. Healing is spontaneous, but may take up to six weeks.

PREVENTIVE MEASURES

The virus is passed to the lamb during lambing season and causes "black lip" with lesions around the mouth, lip, and cornea of the animal. The virus can be contracted directly from the lesions of the nursing lamb or from wool. Control of the disease is dependent on pasture-control measures, since the virus may remain there in the form of dried crusts of lesions. Hygienic precautions should be observed by those who work with sheep.

REFERENCE

1. Moore, R. M., Jr. 1973. Human orf in the United States. J. Infect. Dis. 12:731.

MILKER'S NODULES

POTENTIAL OCCUPATIONAL EXPOSURES

Milk producers, dairy farmers, veterinarians, and cattle breeders who are involved in direct handling of the infected teat of cows with mastitis are at the greatest potential risk (1).

SYNONYMS

Milker's nodes, pseudocowpox, paravaccinia.

ROUTE OF ENTRY

An animal pox virus related morphologically to the virus of contagious ecthyma and bovine papular stomatis enters through a break in the skin of the hands.

HARMFUL EFFECTS

Local—

Single or multiple nodules, usually on hands, occasionally on face or neck. Regional lymph nodes may be enlarged.

Systemic—

The disease is usually confined to the hands, but there may be mild systemic symptoms such as headache, malaise, and fever.

PREVENTIVE MEASURES

Prevention consists of proper management of mastitis in cows and hygienic measures by workers who are involved with these animals. Use of gloves, soap and water wash, and disinfectants is indicated.

REFERENCE

1. Ribboldi, A., G. Ghislanzoni, and M. F. Hofmann. 1972. Occupational diseases of milker's hands. Berufs-dermatosen. 20:166.

NEWCASTLE DISEASE

POTENTIAL OCCUPATIONAL EXPOSURES

Exposure is limited to poultry handlers, veterinarians, and virologists since Newcastle disease is an infectious disease usually confined to birds, produced by *Myxovirus multiforme,* a paramyxovirus.

SYNONYMS

Avian pneumoencephalitis.

ROUTE OF ENTRY

Route of entry is via the upper respiratory tract.

HARMFUL EFFECTS

Local—

Lacrimation, conjunctivitis and edema of the eyelids.

Systemic—

Mild headache, fever, and respiratory involvement occasionally occur. The disease is self-limited. Diagnosis can be confirmed by isolation of the virus in embryonated eggs.

PREVENTIVE MEASURES

Prevention consists of proper care and handling of the infected birds.

VIRAL HEPATITIS

POTENTIAL OCCUPATIONAL EXPOSURES

Two forms of this disease are recognized, serum and infectious (1-4). Those with primary risk to serum hepatitis are health workers where it becomes an occupational disease. The frequency of hepatitis among oral surgeons appears to be quite high.

SYNONYMS

1) Viral hepatitis type A, epidemic hepatitis, catarrhal jaundice, infectious jaundice. 2) Viral hepatitis type B, serum hepatitis, homologous serum jaundice.

ROUTE OF ENTRY

Serum hepatitis is primarily limited to parenteral transmission, and infectious, to fecal-oral transmission. Parenteral transmission of infectious hepatitis can occur, but is rare.

HARMFUL EFFECTS

Local—

None.

Systemic—

Incubation period is from two to six weeks for infectious, seven to 23 weeks for serum hepatitis, followed by jaundice of varying degrees, anorexia, fever, liver enlargement and tenderness, and generalized debilitation. Clinically serum hepatitis and infectious are almost indistinguishable. Diagnosis is established in the laboratory.

PREVENTIVE MEASURES

Prevention of occupational viral hepatitis depends on group and personal measures (isolation of excreta, etc.), sterilization of instruments, the use of disposable instruments (especially needles and syringes), and an awareness of the hazards of transmission, both oral and parenteral, by workers in pediatric wards, hemodialysis units, and the laboratory. Prophylactic use of immune serum globulin will protect against clinical hepatitis in workers who have had accidental contact with positive blood or excreta, if given in the incubation period. Immune serum globulin will also give transient protection to those with potential exposure.

REFERENCES

1. Cassuto, J. 1973. Hepatitis. J. Occup. Med. 14:792.
2. Devenyi, R., and P. Jourdain. 1973. Viral hepatitis in health care personnel working with drug abusers. J. Occup. Med. 15:779.
3. Hayashi, S. J., R. M. Nakamura, and E. A. Giorgi. 1971. Problems of prevention and detection of hepatitis in personnel of hospital hemodialysis unit. J. Occup. Med. 13:388.
4. Redeker, A. G. 1975. Hepatitis B, Risk of infection from antigen-positive medical personnel and patients. J. Am. Med. Assoc. 233:1061.

RICKETTSIAL AND CHLAMYDIAL DISEASES

Rickettsiae formerly classified as viruses, but now considered to be small, true bacteria, multiply in arthropods which are the reservoir and which transmit these organisms to man. Except for Q fever, rickettsial diseases are typified by a characteristic rash and fever. Of occupational interest are Rocky Mountain spotted fever and Q fever.

Chlamydiae, once classified as viruses, and now regarded as bacteria, cause ornithosis (psittacosis) which is of occupational significance.

ROCKY MOUNTAIN SPOTTED FEVER

POTENTIAL OCCUPATIONAL EXPOSURES

Occupations at high risk are foresters, rangers, ranchers, farmers,

trappers, hunters, construction workers, resort operators and lumber jacks when they work in areas where ticks are present, and laboratory workers 1,2,3).

SYNONYMS

New world spotted fever, tick fever, and tickborne typhus fever.

ROUTE OF ENTRY

The reservoir of the causative *Rickettsia rickettsii* is the tick. The disease is transmitted to man by the bite of the infected tick, and by contamination of skin with tick tissue juices or feces. The disease is widespread in the United States.

HARMFUL EFFECTS

Local—

None other than local inflammation and pruritus from the bite.

Systemic—

This disease is characterized by a sudden onset, with persistent fever, headache, chills, myalgia, and conjunctival injection. A maculopapular rash on the extremities occurs about the third day and spreads rapidly to most of the body. Hemorrhages and petechiae are common. Fatality is about 20% in untreated cases; death is uncommon in cases treated promptly.

PREVENTIVE MEASURES

Prevention of the disease is accomplished by avoidance of the tick infested areas and early recognition and careful removal of the tick before attachment is accomplished. Use of repellants is helpful. Measures to reduce tick populations have generally proven impractical. Vaccination is generally limited to persons frequenting highly endemic areas and laboratory workers.

REFERENCES

1. Burdorfer, W. 1975. A review of Rocky Mountain spotted fever (tick-borne typhus), its agent, and its tick vectors in the United States. J. Med. Entomol. 12: 269.
2. Hattwick, M.A.W., R. J. O'Brien and B. F. Hanson. 1976. Rocky Mountain spotted fever: epidemiology of an increasing problem. Ann. Intern. Med. 84:732.
3. Torres, J., E. Humphreys, and A. L. Bisno. 1973. Rocky Mountain spotted fever in the Mid-South. Arch. Intern. Med. 132:340.

Q FEVER

POTENTIAL OCCUPATIONAL EXPOSURES

At highest risk to this disease are dairy farmers, ranchers, stockyard workers, slaughterhouse workers, hide and wool handlers, laboratory workers, and rendering plant workers (1).

SYNONYMS

Australian Q fever, Query fever.

ROUTE OF ENTRY

The reservoir for this rickettsial disease is the tick, wild animals, and domestic cattle, sheep, and goats where it causes no apparent disease. The rickettsiae *(Coxiella burnetti)* are shed by the infected animals in placental tissues and birth fluids. Rickettsiae exist in and around lambing pens and pastures in dried tissues for months. Man is inoculated by inhalation of contaminated dusts from these areas as well as from areas where infected animals are processed. The disease may also be transmitted by contact with the infected animals and contaminated materials such as soiled laundry of infected persons. The milk of infected cattle is also suspect in the transmission of the disease.

HARMFUL EFFECTS

Local—

None

Systemic—

The disease is flu-like in nature. Pneumonitis develops in most cases. Typical clinical manifestations of headache and fever develop after an incubation period lasting from 14 to 29 days. Anorexia and respiratory symptoms are delayed and occur usually on the fifth day after onset. Fatalities are rare, and chronic endocarditis is an infrequent complication. A protracted form of Q fever (without headache and respiratory symptoms) may also occur.

PREVENTIVE MEASURES

Prevention is dependent on avoidance of aerosolized products of conception from ruminant animals, vaccination of individuals at high risk, pasteurization of milk, and regulation of movement of infected animals. Outbreaks are generally of short duration, and the disease in man is controlled by antibiotic therapy.

REFERENCE

1. Brown, G. L. 1973. Clinical aspects of Q fever. Postgrad. Med. J. 49:539.

ORNITHOSIS

POTENTIAL OCCUPATIONAL EXPOSURES

Those individuals at high risk are pet shop owners, taxidermists, zoo attendants, and persons associated with the raising and processing of poultry. Laboratory and hospital personnel may also be occupationally exposed (1, 2).

SYNONYMS

Psittacosis and parrot fever.

ROUTE OF ENTRY

The infecting organism *Chlamydia psittaci* is present in the nasal discharge, droppings, tissues, and feathers of infected birds. Primarily, pigeons, lovebirds, parrots,and domestic fowl serve as a reservoir for the disease. Ornithosis may be contracted by man by inhalation of the dried discharges and droppings of the birds. Occasionally, transmission from human to human has been reported among health care personnel.

HARMFUL EFFECTS

Local—

None.

Systemic—

Following a 7- to 14-day incubation period, infection becomes apparent. Victims most often complain of headache and soon become febrile with a characteristically relatively slow pulse. Other symptoms include lethargy, insomnia, photophobia, nausea, vomiting, and diarrhea. Signs often include proteinuria, abnormal white blood cell count, and enlarged, nontender liver. Commonly, symptoms and chest X-rays indicate pneumonitis. In severe cases myalgia with stiffness and spasms, delirium and stupor, and rarely icterus develop. Diagnosis may be confirmed by a rising titer of complement-fixing antibodies in the blood. Isolation of the causative agent in the serum or sputum is also indicative. Isolation from bronchial secretion may continue for several months or years following an acute episode. Relapse is common.

PREVENTIVE MEASURES

Importation regulations and traffic control of imported birds are important preventive measures.

REFERENCES

1. Durfee, P. T., M. M. Pullen, R. W. Currier II, et al. 1975. Human psittacosis associated with commercial processing of turkeys. J. Am. Vet. Med. Assoc. 167:804.
2. Durfee, P. T. 1975. Psittacosis in humans in the United States, 1974. J. Infect. Dis. 132:604.

BACTERIAL DISEASES

Most frequently seen bacterial infections of an occupational nature are caused by neglected minor wounds, abrasions, and excoriated dermatitis where the integrity of the skin surface is broken. These infections are frequently caused by mixed bacterial infections, but chief among the offending organisms are staphylococci and streptococci. Most of these infections can be avoided by encouraging good personal hygiene habits, and the early reporting and proper care of the minor skin breaks, especially on the hand, forearm, and around the finger nails.

TETANUS

POTENTIAL OCCUPATIONAL EXPOSURES

Those individuals whose occupations include the hazard of traumatic injury, usually of a penetrating or crush type wound, are at highest risk; farmers and ranchers who work around domestic animals and soil are also at risk (1).

SYNONYMS

Lockjaw.

ROUTE OF ENTRY

The route of entry is generally through breaks in the skin from penetrating or crush wounds.

HARMFUL EFFECTS

Local—

None, other than the wound at entry.

Systemic—

This is an acute disease caused by the toxins produced in the body by the *Clostridium tetanii*. The disease is characterized by tonic spasms primarily of the masseter and neck muscles and secondarily of the muscles of the back. These spasms are extremely painful. When untreated, tetanus has a mortality rate greater than 70% in adults.

PREVENTIVE MEASURES

In the past, massive active immunization programs for the general public have been conducted. This is the best method of prevention of the disease. Once the wound has occurred and no prior immunization has taken place, human immune globulin or antitoxin (equine or bovine), administered soon after the injury, may be of use as a preventive measure. Human immune globulin is the preferred treatment as it obviates the risk of serum reaction so often encountered with the antitoxin.

REFERENCE

1. Bizot, W. H. 1963. Tetanus in industry. J. Occup. Med. 5:209.

ANTHRAX

POTENTIAL OCCUPATIONAL EXPOSURES

In the United States this disease is almost exclusively limited to agricultural workers and occupations handling imported goat hair, wool and hides (1).

SYNONYMS

Wool sorters disease, rag sorters disease, malignant pustule, milzbrand, and charbon.

ROUTE OF ENTRY

The anthrax bacillus originally gains entry through small breaks in the skin. Approximately three percent of the cases in the United States are pulmonary through inhaled spores (2-3).

HARMFUL EFFECTS

Local—

At the site of entry vesicles develop initially and progress to a depressed black eschar, at times surrounded by mild to moderate edema. Pain is unusual.

Systemic—

The disease spreads from the local area through the regional lymph nodes and blood stream, which may result in overwhelming septicemia and death in untreated cases. Inhalation of anthrax spores causes initial symptoms that are mild and nonspecific resembling a common upper respiratory infection. Respiratory distress, fever, and shock follow in three to five days, with death commonly 7 to 24 hours thereafter.

PREVENTIVE MEASURES

Certification of imported hides, hair, and wool as anthrax free by the exporting country has helped to reduce the incidence of anthrax. In the United Kingdom imported hair and wool are treated with warm formaldehyde solution. In the United States the chief preventive measure for high risk industrial workers is immunization. Improved personal hygiene of workers, protective clothing, ventilation and housekeeping controls in the plants are also valuable in control of the disease. Vaccination of animals in enzootic areas and strict adherence to laws regarding animals who have contracted or who have died of anthrax have helped reduce agricultural incidence.

REFERENCES

1. Kendall, C. E. 1959. Occupational anthrax in the United States. J. Occup. Med. 1:174.
2. Hughes, M. H. 1973. Anthrax. Br. Med. J. 1(5878):488.
3. Severn, M. 1976. A fatal case of pulmonary anthrax. Br. Med. J. 1(6012):748.

BRUCELLOSIS

POTENTIAL OCCUPATIONAL EXPOSURES

The acute form of this disease is now mainly confined to meat packing house employees and inspectors, livestock producers and marketers, and veterinarians (1,2).

SYNONYMS

Undulant fever, Malta fever, Bang's disease.

ROUTE OF ENTRY

Bacteria gain entry to the body through small cuts and scratches

which are contaminated with blood and fluids of infected animals. The inhalation route from dust around animal pens occurs, but is now quite rare.

HARMFUL EFFECTS

Local—

None.

Systemic—

Onset is with a flu-like syndrome of fever, headache, and myalgias (3). The fever is progressive with weight loss and weakness. The fever is quite characteristically nocturnal with a nearly normal daytime temperature. Chronic forms of brucellosis in the form of splenic abscesses, bone and joint disease with abscess formation, renal disease, and bladder disease are late complications usually occurring 10 - 20 years following an acute episode which was untreated or inadequately treated. Chronic forms of the disease which resemble neurasthenia remain an ill-defined entity both clinically and serologically, and actual existence of chronic brucellosis of this type is doubted. Diagnosis is established by blood cultures and rising agglutination titers.

PREVENTIVE MEASURES

Control of brucellosis in man is contingent upon control of the disease in animals, and the incidence in humans in a given locality is often the index of the disease control effectiveness in the domestic animal population of that locality. Awareness of the disease by the workmen and by doctors who see patients involved in occupations where exposure to infected animals is possible is very important. In the workplace hygienic practices and proper attention to minor cuts and scratches, especially on the hands and forearm can help control the disease.

Brucella canis infections in man are becoming a recognized problem in individuals with contact with dogs. The agglutination test which will identify antibodies in man as a result of infection with the other *Brucella* species is unreliable with *Brucella canis* unless the specific antigen is used.

REFERENCES

1. Busch, L. A., and R. L. Parker. 1972. Brucellosis in the United States. J. Infect. Dis. 125:289.
2. Report to Subcommittee on Public Health. 1970. Brucellosis in the United States. Arch. Environ. Health 25:66.
3. McDevitt, D. G. 1973. Symptomatology of chronic brucellosis. Br. J. Ind. Med. 30:385.

LEPTOSPIROSIS

POTENTIAL OCCUPATIONAL EXPOSURES

Those occupations at risk include farmers, field workers, sugarcane workers, livestock producers and marketers, packinghouse workers, sewer workers, miners, veterinarians, and military troops (1,2).

SYNONYMS

Weil's disease, swineherd's disease, canicola fever, or hemorrhagic jaundice.

ROUTE OF ENTRY

Infection generally results from bacterial penetration of the skin in scratched or abraded areas, and there is some evidence to suggest possibility of infection by ingestion. Leptospira may be found in farm animals, dogs, wild animals, and rats and other rodents. The organism is excreted in the urine, and the disease may be contracted by contact with the infected urine or tissue, and with water polluted with infected urine or tissue.

HARMFUL EFFECTS

Local—

None.

Systemic—

The incubation period is usually around ten days. The acute infection begins with fever, headache, and chills, followed by quite severe malaise, vomiting, muscular aches, and conjunctivitis. Frequently, meningeal irritation occurs and along with jaundice, renal insufficiency, hemolytic anemia, and hemorrhage into the skin and mucous membranes represent the characteristics of severe disease. Fatality rates in these instances may run as high as twenty per cent. Diagnosis is by agglutination and complement fixation tests and culture of leptospiras in blood during acute illness or in urine after the first week.

PREVENTIVE MEASURES

For those who work around suspect animals, protection should be provided by boots and gloves. Control of the disease is accomplished through rodent control, segregation of domestic animals, public health ordinances which prevent drainage from livestock feed lots into fresh water or recreational areas, and vaccination of farm animals and pets.

REFERENCES

1. U.S. Department of Health, Education, and Welfare, Public Health Service, Center for Disease Control. 1971. Leptospirosis Annual Summary. Center for Disease Control, Atlanta.
2. Heath, C. W. Jr., A. D. Alexander, and M. M. Galton. 1965. Leptospirosis in the United States. N. Engl. J. Med. 273:857.

PLAGUE

POTENTIAL OCCUPATIONAL EXPOSURES

Occupational exposure in the United States is primarily in sheepherding families, farmers, ranchers, hunters, and geologists working in sparsely populated areas of the Western states (1).

SYNONYMS

Black Death, Bubonic plague.

ROUTE OF ENTRY

The flea is critical in the maintenance of plague. In the United States, urban type plague has not been encountered since the San Francisco epidemic in 1907-1908. Sylvan plague occurs as a chronic epizootic among wild animals in the United States. Rodents and other wild mammals are the primary animal sources of the disease. The disease is transferred from the infected wild animal to man by the bite of the flea.

HARMFUL EFFECTS

Local—

The lymph nodes draining the site of the original infected bite become acutely inflamed and painful.

Systemic—

The infection spreads from the lymph nodes into the blood stream and produces localized infections in diverse parts of the body. Pneumonic involvement carries a very high mortality rate, and this form of plague is communicable from man to man.

PREVENTIVE MEASURES

Primarily, prevention consists of control of rat populations in urban areas, along with rat proofing of buildings, particularly rat control and rat proofing of harbor and dock areas. Active immunization of persons travelling in endemic plague areas and of laboratory workers is important. Health education efforts should be promoted, especially in the rural areas of the western part of the United States among the native population.

REFERENCE

1. Ree, W. P., D. L. Palmer, R. C. Williams, Jr., and A. L. Kisch. 1970 Bubonic plague in the Southwestern United States—A review of recent experience. Medicine (Baltimore) 49:465.

FOOD POISONING

POTENTIAL OCCUPATIONAL EXPOSURES

Rarely is food poisoning an occupational disease, but in many instances the worker acts as the contaminating agent of otherwise pure food. The three primary types of contamination are by bacteria of the Salmonella group, *Clostridium perfringens*, and *Staphylococcus aureus*. At highest risk are those individuals subjected to mass feeding techniques such as in the military, in prisons, and in certain instances in cafeterias in the workplace.

SYNONYMS

Gastroenteritis, acute G.I.'s.

ROUTE OF ENTRY

In the case of salmonella, entry is by the fecal-oral route. In the case of staphylococcus, the enterotoxin develops entirely within the food and enters orally. *Clostridium perfringens* also enters orally.

HARMFUL EFFECTS

Local—

None.

Systemic—

Symptoms of Salmonellosis usually appear 12 to 24 hours after ingestion of contaminated food, which usually will distinguish it from staphylococcal food poisoning.

It is a febrile disease and can range from a trivial diarrhea to an extremely severe disease with enteric fever, septicemia, dysenteric syndromes, and such focal manifestations as pneumonia, meningitis, and arthritis.

Staphylococcal food poisoning is produced by an enterotoxin which develops as the staphylococcus grows in the food product. Onset of the symptoms usually occurs after three hours, but can vary from one to six depending on the quantity of the toxin ingested. Mild cases cause increased salivation, nausea and vomiting with retching, abdominal pain and cramps, watery diarrhea. Severe cases go on to show bloody vomitus and stool and marked dehydration. Generally speaking there is complete recovery within 24 hours.

Clostridium perfingens is often present in animal tissue which if held at incubating temperatures for several hours prior to consumption can result in proliferation of the organisms and subsequent human illness. The disease is characterized by a sudden onset of abdominal colic which is followed by diarrhea. Nausea is common, but vomiting is rare. The disease is mild and recovery usually occurs within 24 hours.

There is no treatment except symptomatic treatment for uncomplicated food poisoning. Salmonellosis is treated by antibiotic therapy.

PREVENTIVE MEASURES

Primarily prevention consists of proper handling of food products, with clean hands and garments, and with freedom from skin lesions. Refrigeration of the food products at a proper level will prevent the growth of the bacteria. Adequate cooking of foods will kill the salmonella organisms. Once the enterotoxin of the staphylococcus is produced in the food, no amount of cooking, freezing, or any other known method will remove it from the food.

TUBERCULOSIS

POTENTIAL OCCUPATIONAL EXPOSURES

Those individuals who are at greatest occupational risk are health professionals in hospitals and sanitoriums caring for individuals afflicted with this disease.

SYNONYMS

Consumption.

ROUTE OF ENTRY

Entry of the causative agent is by inhalation and by fomites.

HARMFUL EFFECTS

Local—

None.

Systemic—

The majority of cases now involve pulmonary tuberculosis. This is an infectious disease characterized by the formation of tubercles in the tissue of the lung. General symptoms are fever, night sweats, emaciation, and cough with expectoration.

PREVENTIVE MEASURES

Preventive measures include isolation control of patients with an active disease, proper waste handling, repeated Mantoux testing of those individuals involved with the care and treatment of patients with this disease, and periodic X-ray examination of tuberculin-positive personnel.

MYCOBACTERIAL INFECTIONS

POTENTIAL OCCUPATIONAL EXPOSURES

Health care, pathologists, and other laboratory personnel exposed to the tubercule bacilla are at risk of developing innoculation-type cutaneous tuberculosis. Gulf Coast fishermen and operators of tropical fish stores (1,2) are at risk of developing cutaneous granulomas.

SYNONYMS

1) Verruca necrogenica, prospectors' wart, butchers' tubercle; 2) tuberculous paronychia; 3) swimming-pool granuloma, fish-tank granuloma.

ROUTE OF ENTRY

In the case of verruca necrogenica and tuberculous paronychia, entry is generally through a puncture wound or break in the skin, such as a hang-nail, and contamination with *Mycobacterium tuberculosis.* In the case of the granulomatous lesion, route of entry is an abrasion or a puncture wound commonly inflicted by a fish fin or bone. The wound in this instance is contaminated with *Mycobacterium marinum (balnei).*

HARMFUL EFFECTS

Local—

A warty nodule develops at a puncture site or a paronychia develops usually from a hang-nail and neither respond to local treatment, surgical drainage, or antibiotics. They do, however, respond to systemic antituberculosis chemotherapy. Granulomatous lesions are usually confined to the hands and forearms. These also fail to respond to the usual treatment. After diagnosis is made by culture, they do respond to broad

surgical excision of the lesion. Systemic antituberculosis chemotherapy is apparently ineffective. Infections of this type have been acquired in salt water baths in the brackish water of the Chesapeake Bay, and in brackish water of the Alabama and Louisiana coasts.

Systemic—

None reported.

PREVENTIVE MEASURES

Use of gloves is required to protect the hands; prompt and proper care should be given to puncture wounds to prevent infection if a break in skin occurs (1).

REFERENCES

1. Miller, W. C. 1973. Mycobacterium marinum in Gulf fishermen. Arch. Env. Health 27:8.
2. O'Donnel, T. F. Jr., P. F. Furgenson, and N. F. Weyerich. 1971. An occupational hazard—tuberculous paronychia. Arch. Surg. 103-757.

ERYSIPELOID

POTENTIAL OCCUPATIONAL EXPOSURES

This disease is commonly seen in butchers and poultry and fish handlers where puncture wounds from bone spicules and fin spines are frequent (1).

SYNONYMS

None.

ROUTE OF ENTRY

Route of entry is generally through breaks in the skin of the hands caused by scratches, abrasions, and puncture wounds.

HARMFUL EFFECTS

Local—

Infection begins as erythema around the site of the wound with fairly rapid peripheral spread. The spreading edge tends to be painful and there tends to be central clearing as the spreading progresses.

Systemic—

Frequently this disease is associated with painful localized lymphadenitis. Occasionally septicemia can develop, but this can be controlled by the expedient use of antibiotics. Wound cultures of erysipeloid show *Erysipelothrix rhusiopathiae (insidiosa),* but generally the cultures reveal a mixture of organisms.

PREVENTIVE MEASURES

Protective gloves are especially necessary for workers in the poultry industry. There must be prompt and proper attention to bone scratches, puncture wounds, and any other wounds on the hands of employees working around poultry, meat, and fish.

REFERENCE

1. Proctor, D. M., and I. W. Richardson. 1954. A report of 235 cases of erysipeloid in Aberdeen. Brit. J. Ind. Med. 11:175.

TULAREMIA

POTENTIAL OCCUPATIONAL EXPOSURES

Those occupations at highest risk are forestry workers, butchers and locker plant operators, hunters and cooks, farmers, veterinarians, and laboratory workers (1).

SYNONYMS

Deer fly fever, rabbit fever.

ROUTE OF ENTRY

This is a disease of rodents, resembling plague, which is transmitted by bites of flies, fleas, ticks, and lice and may be acquired by man through handling of infected animals. It is caused by *Francisella tularensis*. Generally speaking the route of entry is through small cuts and scratches on the hands from the lesions of the infected animals. This is particularly true of hunters who dress wild rabbits and women who handle these wild rabbits in cooking. Inoculation of the conjunctival sac occurs when infectious fluids are splashed in the eye or from wiping eyes with contaminated fingers. Man may become infected from the bites of infected insects; from bites of animals carrying the organism in their mouth as a result of feeding on infected carcasses; by eating insufficiently cooked infected meat; or by drinking contaminated water.

HARMFUL EFFECTS

Local—

In man, an ulcer forms at the site of the inoculation, followed by inflammation of the regional lymph nodes.

Systemic—

Severe constitutional symptoms usually appear following the development of the ulcer. These consist of headache, myalgia, chills, and rapid rise in temperature.

PREVENTIVE MEASURES

Control of the disease depends on the use of rubber gloves in handling carcasses of wild animals or safety hoods in laboratory experimentation; avoidance of arthropods, flies, mosquitos, and wood ticks when working in endemic area; avoidance of drinking raw water in endemic areas; and thorough cooking of wild game.

REFERENCE

1. Boyce, J. M. 1975. Recent trends in the epidemiology of tularemia in the United States. J. Infect. Dis. 131:197.

FUNGAL DISEASES

The incidence of fungal disease of an occupational nature is not great and is mainly confined to farmers, outdoor workers, and animal raisers. Diagnosis in fungal diseases is made by microscopic identification of the fungus with cultural confirmation.

Fungal diseases may be roughly classified by systemic, subcutaneous superficial, or hypersensitivity effects. Occasionally, the subcutaneous fungal diseases may spread systemically. Systemic effects may be due to opportunistic fungal disease such as candidiasis or aspergillosis which mainly disseminate in individuals with lowered resistance or increased susceptibility. Histoplasmosis and coccidioidomycosis are not opportunistic in the sense that they occur systemically in healthy individuals. Subcutaneous infections, usually introduced through a penetration of the skin, include mycetoma, sporotrichosis, and chromoblastomycosis. The dermatophytoses, including the *Tinea* groups, are superficial infections caused by three genera of fungi. Finally, there may be hypersensitivity reactions due to fungal antigens inhaled with dusts during agricultural or other activities. These usually involve pneumonitis with asthmalike symptoms.

CANDIDIASIS

POTENTIAL OCCUPATIONAL EXPOSURES

Those occupations at high risk are dishwashers, bartenders, cooks, bakers, poultry processors, packinghouse workers, cannery workers, and certain health workers.

SYNONYMS

Moniliasis, thrush.

ROUTE OF ENTRY

Candida albicans is still considered the major cause of candidiasis, although other species of the same genus have been found to produce similar signs and symptoms. Candida species are ubiquitous in nature and are considered part of the normal human flora. It is a mild and opportunistic infection involving the skin and mucous membranes.

HARMFUL EFFECTS

Local—

Candidiasis is manifested by cutaneous, oral, and vaginal lesions. These can become chronic and spread to other mucosal surfaces or intertriginous areas in the groin, anti-cubital fossa, interdigital folds, the inframammary areas, the umbilicus, and the axilla.

Systemic—

Systemic effects are rare and are usually found in persons having surgery, diabetes mellitus, debilitating diseases, and immunosuppressive

and antibiotic therapy. Aspiration pneumonia is probably the chief form of visceral candidiasis. Endocarditis, meningitis, and ulcers of the digestive tract are occasionally seen. Frequently these systemic complications are fatal.

PREVENTIVE MEASURES

In those occupations predisposed to working in water, proper care and protection of the hands is essential. Protective cream and/or gloves are indicated.

ASPERGILLOSIS (Allergic)

POTENTIAL OCCUPATIONAL EXPOSURES

The occupational instance of this disease is limited by the opportunistic nature of the *aspergillus* species (1,2). *Aspergillus* is a group of fungi of low pathogenicity for man unless resistance is overcome by an overwhelming inoculum or debilitating illness. Farmers and grain mill workers are at high risk because the plant and animal matter in their work environment provide excellent growth media for fungal spores. Bird handlers and raisers are also at high risk.

The syndrome of allergic aspergillosis occurs in asthmatics who develop hypersensitivity to aspergillus antigens. Allergic reactions occur in workers in rope factories (hemp disease) and are a frequent result of aspergillosis exposure in Great Britain.

SYNONYMS

Hemp disease.

ROUTE OF ENTRY

Route of entry is generally by inhalation of the spores.

HARMFUL EFFECTS

Local—

Aspergillus fumigatus and other species of aspergillus are the cause of aspergillosis. The fungus is usually found in large colonies in moist, decaying vegetation heated by bacterial fermentation and in warm, cereal grain storages. The disease may become disseminated or localized to the lung, ear, orbit, or parinasal sinuses.

Systemic—

Secondary invasion by the hyphae into the blood stream may disseminate the fungus to other parts of the body. Formation of abscesses or granulomas in the brain, heart, kidney, and spleen may occur.

PREVENTIVE MEASURES

Farmers and grain mill workers working where the presence of fungi is suspected should be provided with protective masks.

REFERENCES

1. de Haller, R. and F. Suter, eds. 1974. Aspergillosis and Farmer's Lung in Man and Animal. Huber, Bern.
2. Jordan, M. C., C. W. Bierman, and P. P. VanArsdale, 1976. Allergic bronchopulmonary aspergillosis. Arch. Intern. Med. 128:576.

COCCIDIOIDOMYCOSIS

POTENTIAL OCCUPATIONAL EXPOSURES

This disease is endemic in the arid and semiarid areas of the Southwestern United States and parts of northern Mexico and Argentina. It is caused by the inhalation of the spores of *Coccidioides immitis*. The infections generally occur during the dry season and following dust storms. At high risk to coccidioidomycosis are migrant workers, farmers, construction workers, military personnel, bulldozer operators, and excavation workers in these endemic areas. Also at risk are cotton mill workers and laboratory personnel who frequently handle the organisms in the laboratory (1).

SYNONYMS

Valley fever, coccidioidal granuloma.

ROUTE OF ENTRY

The fungus gains entry by inhalation of dust.

HARMFUL EFFECTS

Local—

None.

Systemic—

Inhalation of the dust causes a respiratory infection, which is usually symptomatic. The clinical picture presented is one of acute bronchitis or pneumonia; chills, fever, cough, and poorly localized chest pain. Recovery normally follows in two or three weeks leaving some pulmonary scarring and, in severe cases, calcification or cavity formation. In some individuals who have had prior exposure to *Coccidioides immitis*, hypersensitivity results and is manifested in two forms: 1) erythema multiforme and erythema nodosum—sterile, self-limiting skin lesions of the lower extremities (Valley fever) and 2) pleural effusion—a result of antigenic material introduced into the pleural cavity. Coccidioidal granuloma is a disseminated form of coccidioidomycosis which is often fatal. Abscess formation in the lungs and the rest of the body, including the central nervous system, may occur. Immunologic resistance develops in individuals who recover. There are occasions of unusual syndromes (2).

PREVENTIVE MEASURES

Laboratory workers should be especially careful when handling this organism. Workers from nonendemic areas should not be recruited for dusty operations in endemic areas. Dust in areas around camps and

construction sites can be controlled by planting grass or by watering or oiling exposed soils, roads, and airstrips. Where the fungus is known to exist and the worker cannot otherwise be protected, he should be supplied with a mask.

REFERENCES

1. Gelbach, S. H., J. D. Hamilton, and N. F. Conant. 1973. Coccidioidomycosis; an occupational disease in cotton mill workers. Arch. Intern. Med. 131:254.
2. Bayer, A. S., T. T. Yoshikawa, J. E. Galpin, and L. B. Guze. 1976. Unusual syndromes of coccidiomycosis: diagnostic and therapeutic consideration; a report of 10 cases and review of the English literature. Medicine (Baltimore) 55:131.

HISTOPLASMOSIS

POTENTIAL OCCUPATIONAL EXPOSURES

This disease is an opportunistic primary pulmonary infection which occasionally disseminates. The occurrence is worldwide (1). The causative agent, *Histoplasma capsulatum,* is a dimorphic fungus growing on soils enriched by bat, chicken, and other bird excrement. Occupations that involve employment around old barnyards, chicken houses, or caves are likely to have a high incidence of the disease. Farmers who spread fertilizers or soil containing chicken droppings or large quantities of organic matter may also be exposed. Occasionally cases occur among construction workers resulting from exposure when a building which pigeons have adopted as a nesting and roosting site is demolished or when ground under the roost of wild birds is disturbed.

SYNONYMS

Darling's disease, reticuloendotheliosis.

ROUTE OF ENTRY

In most cases the portal of entry is the lung. Infection may occur through the gastrointestinal tract, but this is thought to be secondary to primary lesions of the mouth and pharynx.

HARMFUL EFFECTS

Local—

Chronic localized histoplasmosis takes two primary clinical forms: a) pulmonary; this type of infection resembles pulmonary tuberculosis in all respects; b) mucocutaneous ulcers of the mouth, tongue, pharynx, gums, larynx, penis, or bladder; these are rare lesions found only in adults.

Systemic—

Pulmonary histoplasmosis ranges from a slight self-limited infection to fatal disseminated disease. Least resistance to histoplasmosis is found in young infants and in adults after the fifth decade.

Adult histoplasmosis shows a marked predilection for men. Histoplasmosis of the lips, nose, mouth, and larynx occurs almost exclusively

in adults, and is the initial manifestation in about one third of all fatal cases. Adult complications of the disease include subacute vegetative endocarditis, massive lymphadenopathy resembling tuberculosis or lymphoma, various forms of pneumonia, cerebral histoplasmoma, and meningitis.

In infants there is fever, emaciation, anemia, leukopenia, and evidence of the widespread involvement of the viscera including liver, spleen, lung, lymph nodes, adrenals, skin, kidney, brain, eyes, and endocardium.

PREVENTIVE MEASURES

The incidence of histoplasmosis is limited by the control of exposures and by dust control methods (watering or oiling of soil surfaces). Disinfectant solutions may also be sprayed on the soil. Use of masks is recommended in areas which are known to be contaminated when exposure cannot be prevented.

REFERENCE

1. Vanek, J., and J. Schwarz. 1971. The gamut of histoplasmosis. Am. J. Med. 50:89.

MYCETOMA

POTENTIAL OCCUPATIONAL EXPOSURES

At special risk are farmers and individuals exposed to puncture wounds.

SYNONYMS

Maduromycosis.

ROUTE OF ENTRY

Route of entry is penetration through skin usually by puncture wounds and usually following trauma. Reservoir for the fungi is in soil and decayed vegetation.

HARMFUL EFFECTS

Local—

The condition can be caused by true fungi or by actinomycetes producing a lesion. Sinus tracts develop presenting colonies of fungus (granules) in the exudate. Isolation of the fungus in culture and study of the granules are necessary for identification of the microorganisms.

Systemic—

The causative organism rarely disseminates, and systemic effects are minimal.

PREVENTIVE MEASURES

Prevention of disease is dependent on the prevention of puncture wounds (1). Treatment is difficult and frequently ineffective and amputation may become necessary.

REFERENCES

1. Zaias, N., D. Talpin, and G. Rebell. 1969. Mycetoma. Arch. Derm. 99:215.

SPOROTRICHOSIS

POTENTIAL OCCUPATIONAL EXPOSURES

Sporotrichosis is a subcutaneous mycotic infection. The agent, *Sporothrix (Sporotrichum) schenkii,* is a saprophyte on plants and may be present on thorns or in sphagnum moss (1). Those at highest risk are farmers and gardeners, horticulturists, florists, nursery workers, and those using sphagnum moss. It has also been reported in miners in South Africa who came in contact with heavily infected timber shorings.

SYNONYMS

None.

ROUTE OF ENTRY

The principal route of entry is by contaminated splinters or soil penetrating the skin through cuts and scratches.

HARMFUL EFFECTS

Local—

The fungus causes a series of hard, red, nodular lesions as it spreads up the extremities, following the lymphatic system. The nodules are granulomas which undergo necrosis and become ulcerated.

Systemic—

Rarely does this disease become systemic, but when it does it involves muscles, mucus membranes, the viscera, the skeletal system, and, even more rarely, the lungs (2).

PREVENTIVE MEASURES

Prevention consists of protection of the hands and forearms especially against splinters, thorns, and contaminated soil. This is especially important for people working with sphagnum moss and can be afforded by long gloves and arm protectors.

REFERENCES

1. D'Allessio, D. J., L. J. Leavens, G. B. Stumpf, and C. D. Smith. 1965. An outbreak of sporotrichosis in Vermont—Association with sphagnum moss as a source of infection. N. Eng. J. Med. 272:1054.
2. Evers, R. H., and R. R. Whereatt. 1974. Pulmonary sporotrichosis. Chest. 66:91.

CHROMOBLASTOMYCOSES

POTENTIAL OCCUPATIONAL EXPOSURES

Chromoblastomycoses are subcutaneous mycoses caused by a group of fungi which are slow growing saprophytic fungi (1). Those at highest risk are farm workers and other individuals subjected to scratches on the feet and legs, particularly those who live in tropical areas.

SYNONYMS

Verrucous dermatitis.

ROUTE OF ENTRY

The route of entry is any break in the continuity of the skin of the feet and the legs.

HARMFUL EFFECTS

Local—

At the site of the wound a progressive cauliflower-like lesion is produced on the skin. The disease itself is characterized by dermal microabscesses containing fungi, by epidermal hyperplasis and hyperkeratosis, and by extensive fibrosis which may obstruct the lymph channels.

Systemic—

Usually none, unless the lymphatic scarring results in elephantiasis. Hematogenous spread to the groin has been reported.

PREVENTIVE MEASURES

Preventive measures include the wearing of shoes and the covering of the legs of workmen to prevent the cuts and scratches necessary to introduce the fungi.

REFERENCES

1. Carrion, A. L. 1975. Chromoblastomycosis and related infections: New concepts, differential diagnosis and nomenclatorial implications. Int. J. Dermatol. 14:27.

DERMATOPHYTOSES

POTENTIAL OCCUPATIONAL EXPOSURES

These infections are caused by three genera of fungi. At high risk are farmers, animal handlers, pet and hide handlers, wool sorters, cattle ranchers, athletes, lifeguards, gymnasium employees, and animal laboratory workers.

SYNONYMS

Ringworm, athlete's foot, jock strap itch.

ROUTE OF ENTRY

The main reservoir of these superficial fungi is in man and animals. Ringworm of the feet or athlete's foot develops in areas of maceration between the toes. Ringworm of the nails is generally due to spread from ringworm on the feet or hands. Ringworm of the groin occurs in the folds of the upper inner thigh where chafing and irritation are common. Ringworm of the body or ringworm of the hand are usually due to contact with animals or other human beings with similar conditions. Ringworm of the scalp can be due to contact with animals, but most generally it is transmitted from man to man.

HARMFUL EFFECTS

Local—

In all of these superficial ringworm infections, it is necessary to make sure of the diagnosis by cultural methods if possible because they mimic too closely other diseases.

The lesion of the skin is characteristically flat, spreading, ring shaped, with reddish, vesicular, scaly or crusted periphery, and a central clearing area. The lesion of nails and of hair demonstrates a keratolytic property of the ringworm fungus, which can cause the nail to disintegrate; hair to dissolve; and the scaffolding of the stratum corneum, the keratinized cell, to be demolished. Living epidermis is not affected.

Ringworm of the feet is the most common type of ringworm infection. The intertriginous involvement may remain chronic and localized or may develop acute exacerbations, with extensive formation of vesicles and bullae over the feet and occasionally vesicular lesions elsewhere on the body, particularly the hands ("id" reaction).

Systemic—

None

PREVENTIVE MEASURES

Prevention depends on recognition of the disease in animals and proper handling techniques with these animals. Also necessary are sterilization and proper laundering of towels and general cleanliness in showers and dressing rooms of gymnasiums and swimming pools. Education for personal hygiene is also effective control.

MISCELLANEOUS FUNGAL DISEASES

POTENTIAL OCCUPATIONAL EXPOSURES

There is a group of conditions related to inhalation of fungus and actinomycetes spores which are hypersensitivity diseases (1-6). Repeated exposure sensitizes the individual to the spores (protein sensitization), and the disease state recurs on subsequent exposure. At high risk are farmers who handle hay in confined areas, saw mill operators, mushroom workers, sugarcane workers, cork workers, workers exposed to redwood processing, and workers handling other agricultural products on an industrial basis such as seeds, textile fibers, wood, and gum.

SYNONYMS

Farmer's lung, maple-bark disease, mushroom worker's lung, bagassosis, suberosis (cork mold), sequoiosis (redwood mold).

ROUTE OF ENTRY

Inhalation of the spores is the primary route of entry.

HARMFUL EFFECTS

Local—

None.

Systemic—

High exposure to the spores as in "farmer's lung" may cause an acute respiratory infection and the offending fungi may be cultured from the sputum. Repeated exposure sensitizes these individuals to the spores and these workers may develop acute asthmatic attacks even when the dust is very dilute in the atmosphere.

PREVENTIVE MEASURES

Prevention is possible through proper handling of products contaminated with molds, proper ventilation, and use of dust respirators able to retain the smallest spores. Once the hypersensitivity reaction is recognized, an individual should not be subjected to further exposure.

REFERENCES

1. Wenzel, F. J., and D. A. Emanuel. 1967. The epidemiology of maple bark disease. Arch. Env. Hlth. 14:385.
2. Wintrobe, M. M. et al., eds. 1970. Harrison's Principles of Internal Medicine, 6th ed. McGraw-Hill Book Company, New York.
3. Kaltreider, B. F. 1973. Hypersensitivity pneumonitis: Immunologically mediated lung disease resulting from the inhalation of organic antigens. J. Occup. Med. 15:949.
4. Reed, C. E. 1972. Hypersensitivity pneumonitis. Post Grad. Med. 51(2):121.
5. Lacy, J. 1973. The air spora of a portuguese cork factory. Ann. Occup. Hyg. 16:223.
6. Nicholson, D. P. 1972. Extrensic allergic pneumonitis (editorial) Am. J. Med. 53:131.

PARASITIC DISEASES

Parasitic infections of occupational significance are caused by protozoa, helminths, and arthropods. Diseases caused by protozoa include malaria, amebiasis, leishmaniasis, trypanosomiasis, and a variety of less common blood and gastrointestinal infections. Helminthic diseases include schistosomiasis, creeping eruption, and hookworm. Arthropods such as mites and chiggers, may cause dermatoses and may act as vectors or hosts for other nonarthropod parasites.

Many parasitic diseases are zoonoses; that is, they are transmissible under natural conditions between vertebrate animals and man. Parasitic diseases may have reservoirs in infected wild or domestic animals, or in infected persons. Recent increases in the amount and speed of international travel have resulted in dissemination of parasitic diseases to areas where they have been unknown or uncommon. The physician should be alert to the possibility that diseases usually considered exotic or tropical may appear in urban areas in nontropical regions, and may even be transmitted under seemingly improbable circumstances.

Certain occupational groups are at great risk of contracting a parasitic disease because of their exposure to vectors carrying a parasitic disease, their direct contact with the infective form of a parasite, and indirectly their presence in areas where conditions are crowded or sanitation and hygiene are inadequate.

SWIMMER'S ITCH

POTENTIAL OCCUPATIONAL EXPOSURES

Individuals at risk include those required to work in and around fresh lakes, ponds, and swamps, e.g., skin divers, dock workers, watermen, and lifeguards.

SYNONYMS

Schistosome dermatitis, cercarial dermatitis, clam digger's itch, swamp itch.

ROUTE OF ENTRY

Route of entry is by penetration of certain species of freshwater schistosome cercariae through the wetted skin.

HARMFUL EFFECTS

Local—

Itching during the drying of exposed wetted skin surfaces is followed initially by localized redness and edema and later by pruritic macules and papules. Occasionally areas covered by clothing will also be affected.

Systemic—

None.

PREVENTIVE MEASURES

Exposed wetted skin should be thoroughly dried immediately. Cercariae in small bodies of water can be controlled by addition of a mixture of copper salts or by spraying with formaldehyde.

CREEPING ERUPTION

POTENTIAL OCCUPATIONAL EXPOSURES

Those occupations at highest exposure are ditch diggers, masons, gardeners, utility workers, laborers, plumbers, and lifeguards. It is prevalent in areas where hookworm eggs in cat or dog feces are deposited on warm sandy soil and subsequently develop into infective larvae.

SYNONYMS

Cutaneous larva migrans.

ROUTE OF ENTRY

Penetration of the skin is the route of entry. The eggs discharged in the feces develop into a filariform stage and then are capable of penetrating the skin. Transmission to man requires environmental temperature and humidity appropriate for development of the egg to the infective filariform larval stage. Beaches and other moist sandy areas are hazardous, because animals choose such areas for defecation.

HARMFUL EFFECTS

Local—

Larvae burrow into the skin, producing a serpiginous track of erythema, induration, and pruritis.

Systemic—

None.

PREVENTIVE MEASURES

Recreational areas should be kept free of dogs and cats. Individuals whose occupations require they work in moist, warm, sandy soil, particularly in the southern parts of the United States, should be supplied with rubber boots and gloves.

HOOKWORM DISEASE

POTENTIAL OCCUPATIONAL EXPOSURES

This disease prevails in tropical countries where defecation on soil by infected persons permits development of the larvae, and subsequent infection by others contacting the larvae. Warm climate, sandy soil, and moisture favor continuation of the cycle. Individuals whose occupations bring them into direct contact with the soil, for instance, barefoot farmers in the South, ditch diggers, sewer workers, and recreation workers and lifeguards at recreational beaches, are at high risk of exposure.

SYNONYMS

Ancylostomiasis, uncinariasis.

ROUTE OF ENTRY

The larvae invade the exposed skin.

HARMFUL EFFECTS

Local—

At the site where the larvae invade the skin, there is erythema and edema, with severe pruritis. The most frequent area of these penetrations is the feet, especially the interdigital area, and this circumstance has been called "ground itch" in those localities.

Systemic—

The hookworm migrates from the skin via the circulatory system through the lungs, to the gastrointestinal tract. The hookworm attaches to the wall of the small intestine. Nonspecific gastrointestinal symptoms occur. The major finding in these cases is an iron-deficiency anemia as a consequence of chronic intestinal blood loss caused by the parasites.

PREVENTIVE MEASURES

Education of rural populations and field workers to use sanitary facilities for the proper disposal of feces is necessary. Elimination of soil pollution is necessary in order to control this disease. There should

be mandatory wearing of shoes and/or rubber boots and the protection of hands by gloves to protect individual workers.

ASCARIASIS

POTENTIAL OCCUPATIONAL EXPOSURES

Ascariasis is a nematode infection which may be occupationally important where human feces are deposited on the soil rather than in sanitary facilities. Those occupations at high risk are the same as for hookworm.

SYNONYMS

None.

ROUTE OF ENTRY

The route of entry is the oral route, generally by the ingestion of embryonated eggs contained in contaminated food, or by the introduction of the eggs into the mouth by the hands after contact with contaminated soil.

HARMFUL EFFECTS

Local—

None.

Systemic—

After the eggs are ingested, the larvae are liberated in the small intestine. They migrate through the intestinal wall and ultimately reach the lung. After a short period of time, the larvae pass through the bronchioles, bronchi, trachea, and epiglottis, are swallowed, and develop into male and female adults in the small intestine. Clinical manifestations are usually diverse; severe bronchopneumonia can develop with heavy infections, as can abdominal pain in partial or complete intestinal obstruction.

PREVENTIVE MEASURES

As with hookworm this is a matter of education of those people in exposed areas to the proper disposal of feces and strict attention to personal hygiene (1,2).

REFERENCES

1. World Health Organization. 1967. Control of Ascariasis, World Health Organization Technical Report Series No. 379. World Health Organization, Geneva.
2. Barrett-Connor, E. 1972. Human intestinal nematodiasis in the United States. Calif. Med. 117:8.

MITES, CHIGGERS, AND TICKS

POTENTIAL OCCUPATIONAL EXPOSURES

These are mainly ectoparasites, and may transmit disease. Eggs

are deposited in soil or on a host, and hatch into parasitic larvae which feed on blood. The chigger is commonly encountered in grassy areas in large areas of the United States but predominantly in the South. The larvae crawl up the legs of man or animals and attach to the skin. Those at highest risk are construction workers, linemen, farmers, pipeline workers, and surveyors.

The fowl or chicken mite which parasitizes both wild and domestic fowl is sometimes a parasite of man. Poultry workers are likely to be affected.

Mites of the family Pyemotidae attack man and cause a dermatitis called "straw itch" or "grain itch." Persons at risk include farmers, gardeners, potters, broommakers, and others handling wheat, barley, or straw. These mites exist in grain elevators, straw mattresses, and dust from farm machinery.

Mites belonging to the family Acaridae infest cereals, grains, copra, vanilla pods, and cheeses. Persons handling these products can become occupationally exposed.

The wood tick, the dog tick, the Lone Star tick, and the Gulf Coast tick have all been incriminated in the transmission of disease to man by their bite. Those individuals most likely to be subjected to tick bite are individuals whose occupations require them to be in contact with nature, such as forest rangers, woodsmen, employees of recreational areas, hunters, trappers, ranchers, and farmers.

SYNONYMS

None

ROUTE OF ENTRY

In all instances route of entry is by the bite of the parasite through the skin of man.

HARMFUL EFFECTS

Local—

Chigger bites appear on the lower legs and elsewhere at sites of clothing restriction. Itching and swelling surround the bite for one or two days, after which the surrounding area may become edematous, indurated, or dusty red in color. Itching may cause loss of sleep and fever and secondary infection may be present.

The fowl or chicken mite causes itching and dermatitis. This mite has been demonstrated to carry viruses which cause St. Louis encephalitis, Newcastle disease, and western equine encephalitis. Food mites produce pruritic papular eruptions on exposed areas, usually shoulders and chest. A tick bite is usually quite innocuous, and it is only the presence of the tick that draws attention to the bite. Removal of the tick is important in that the tick should not be crushed and care must be taken so that the head is also removed.

Systemic—

In most cases, none. Secondary infection occurs. In the case of the

tick, if the head is not completely removed or if the tick is allowed to remain for days feeding on human blood, a condition known as tick paralysis can develop, which is due to a neurotoxin which the tick apparently injects while engorging. This acts upon the spinal cord and bulbar nuclei causing incoordination, weakness, and paralysis.

PREVENTIVE MEASURES

Preventive measures include use of protective clothing, insecticides, and repellants and paying close attention to personal hygiene (1).

REFERENCE

1. Gouck, H. K. 1966. Protection from ticks, fleas, chiggers, and leaches. Arch. Dermatol. 93:112.