IV THERAPY (FLUIDS AND ELECTROLYTES, BASICS)

18-1.  GENERAL.  Assuming you will be deployed and not have the capabilities to determine serum electrolytes, the following information is presented to keep you and your patient out of trouble.  First, let's consider the composition of some common IV fluids (see table below).

| Solution | Na | K | Cl | HCO3 | Ca | Mg | Calories | CH2O gm |
|----------|-----|-----|-----|------|-----|-----|----------|---------|
| Ringer's lactate | 130 | 4 | 109 | (28) | 3 | - | - | - |
| Normal saline | 154 | - | 154 | - | - | - | - | - |
| D5W | - | - | - | - | - | - | 200 | 50 |
| D5NS | 154 | - | 154 | - | - | - | 200 | 50 |
| D5 .2NS | 34 | - | 30 | - | - | - | 200 | 50 |
| D5 .45NS | 77 | - | 74 | - | - | - | 200 | 50 |
| D10W | - | - | - | - | - | - | 400 | 100 |
| Ringer's solution | 147 | 4 | 155 | - | 4 | - | - | - |

Na = Sodium, K = Potassium, Cl = Chlorine, $HCO_3$ = Bicarbonate, Ca = Calcium, Mg = Magnesium, $CH_2O$ = Carbohydrates

18-2.  COMMON PROBLEMS.

     a.  Now, what type of solution would you use for daily maintenance of an N.P.O. patient?  Considering the daily requirements of Na (70 mEq.), K (40-60 mEq.), CHO (150-200 gm) and water to be 2 liters, the following should be given:

          1,000 cc. D10W + 20 mEq. KCl over 12 hours
            500 cc. D10W + 10 mEq. KCl over  6 hours
            500 cc. D5NS + 10 mEq. KCl over  6 hours

     b.  Daily fluid requirement for infants and children according to body weight.
          0-10 kg. - 100 cc./kg.

          11-20 kg. - $\frac{100 \text{ cc./kg.}}{10}$ + 50 cc./kg.

          21 kg. and over - $\frac{100 \text{ cc./kg.}}{20}$ + 50 cc./kg. + 25 cc.

     c.  Next, how would you replace fluid removed by an NG tube - in addition to daily maintenance requirements?  Electrolytes common to gastric secretions are Na (40 mEq. per liter), K (10 mEq./L.), and Cl (140 mEq./L.).  An appropriate replacement would be daily maintenance plus 1 liter per liter loss replacement of D5 .2NS + 20 mEq. KCl.

d.   For the last common problem, consider replacement of fluid lost by diarrhea.  Electrolytes common to diarrheal fluid are Na (50 mEq./L.), K (35 mEq./L.), Cl (40 mEq./L.) and $HCO_3$ (45 mEq./L.).  Appropriate fluid for diarrheal losses would be daily maintenance plus liter for liter replacement with 1,000 cc. D5W + 35 mEq. KCl + 45 mEq. $NaHCO_3$.

18-3.  ADJUSTMENT FOR INCREASED BODY TEMPERATURE, ENVIRONMENTAL TEMPERATURE, AND HYPERVENTILATION.

| Fever | Environmental Temperature | Respiratory Rate | Additional Fluid Allowance |
|-------|---------------------------|------------------|----------------------------|
| 101°F. or less | 85°F. or less | 35 or less | None |
| 101-103°F. | 85-95°F. | Over 35 | 500 cc. $H_2O$ |
| Over 103°F. | 95°F. or less | - | 1,000 cc. $H_2O$ |

18-4.  BURNS - FLUID THERAPY.

a.   Brooke Formula - first 24 hours.

(1)   Colloids (plasma, plasmanate, or dextran) .5 ml./kg./% body surface burned.

(2)   Electrolyte solution (Lactated Ringer's) 1.5 ml./kg./% body surface burned.

(3)   $H_2O$ requirement (D5W) 2,000 cc. for adults - for children correspondingly less.

ROUGH GUIDE FOR $H_2O$ REQUIREMENT IN CHILDREN:

During first 2 yrs - 120 cc./kg.
  2d  - 5th yr - 100 cc./kg.
  5th - 8th yr - 80 cc./kg.
  8th - 12th yr - 50 cc./kg.

BURNS COVERING MORE THAN 50% OF THE BODY SURFACE ARE CALCULATED AS 50% OR EXCESS FLUID WILL BE GIVEN!!!

b.   In the second 24 hours about one-half the colloid and electrolyte requirement of the first 24 hours is needed.

DENTAL EMERGENCIES AND TREATMENT

19-1. GENERAL.

a.  A tooth is divided into two major parts:  the crown (portion of the tooth normally visible in the mouth) and the root or roots (portion embedded in the socket and partially covered by soft tissue).

b.  The crown has five surfaces:  the occlusal or biting surface, the lingual or tongue side surface, the facial or cheek side surface, and the other two surfaces (mesial and distal) that come in contact with adjacent teeth (mesial being the contacting surface nearest the midline and distal the farthest from the midline).  All surfaces may be affected by dental decay (caries).



MAXILLARY TEETH (UPPER)

MANDIBULAR TEETH (LOWER)
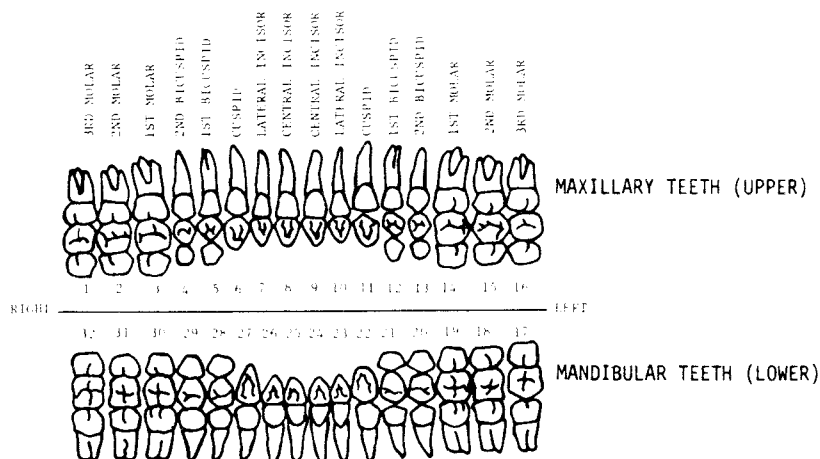
19-2. TOOTHACHES.  Toothaches are usually associated with one of the following:  caries (decay); tooth, crown, or root fractures; and acute periapical (root end) abscess.

19-3. CARIOUS LESIONS IN VITAL TEETH.

a.  Diagnosis.  Finding the offending tooth may be difficult.  The patient with a toothache resulting from a carious lesion will usually present the following symptoms:

(1)  Intermittent or continuous pain that is usually intense.

(2)  Pain may be caused by heat, cold, sweet, acid, or salt substances.

(3)  The tooth will usually be grossly carious (decayed).

(4)  The carious enamel and dentin are discolored.

(5) Tapping the tooth with an instrument will usually elicit pain.

   b.  Diagnostic test.

      (1)  Thermal tests can be used; however, if hot and cold are used, a normal tooth must be tested also and used as a basis for comparison.  The application of cold to normal teeth elicits pain in most instances, but the response ceases soon after the stimulus is removed.  A diseased tooth, compared to a normal tooth, varies in its reaction to the temperature test.  For example, a reaction to cold persists after application stops and the tooth responds very little to heat or the reaction to heat persists after application and the tooth appears to respond very little or not at all to cold.

      (2)  Thermal test procedure.

         (a)  Isolate the teeth to be tested from the saliva with gauze packs.

         (b)  Cold test.  Spray a cotton-tipped applicator with ethyl chloride and place the cold surface on the tooth crown.  Note the response and its duration.  (Ice may also be used).  A vital tooth will give a painful response to cold.

         (c)  Heat test.  Heat an instrument (e.g., a mouth mirror handle) and touch against the tooth.  Note the response and duration.

         (d)  Test an unsuspected tooth for comparison.

         (e)  Check vitality by touching sound dentin (pain upon touching dentin indicates vitality).

   c.  Treatment.

      (1)  This treatment regimen will only work on teeth that are still vital.  Eugenol is an agent that will sooth hyperemic pulp tissue if treated indirectly (if not in direct contact with the pulp).  If a mix of zinc oxide and eugenol is applied directly to vital pulp, it will kill the pulp.

      (2)  After finding the source of pain, local anesthetic will probably be necessary to carry out the following:

         (a)  Remove as much of the soft decayed material as possible with a spoon-shaped instrument.  If the patient is properly anesthetized he should feel no pain.

         (b)  Irrigate the cavity with warm water until loose debris has been flushed out.

         (c)  Isolate the tooth with gauze packs and gently dry the cavity with cotton pledgets.

         (d)  Mix zinc oxide powder with two or three drops of eugenol on a clean dry surface (parchment pad) until a thick puttylike mix is obtained.

(e)  Fill the cavity with the zinc oxide-eugenol paste, tamping it gently (use the Woodson Plastic Instrument #2 or #3).

(f)  Relieve interference with opposing teeth by having the patient bite several times.  Surplus filling material is easily removed by lightly rubbing the tooth with a moist cotton pledget.  The pain should disappear in a few minutes and the paste will harden within an hour.  Caution the patient not to chew on the treated tooth.

(g)  If zinc oxide powder is not available, a cotton pledget impregnated with eugenol may be left in the cavity.

(h)  Instruct the patient that the procedure is temporary and definitive care must be given by a dental officer.

19-4. TOOTH CROWN FRACTURES.  The anterior (front) teeth are particularly susceptible to injuries that result in fracture of the crown.  The classification and emergency treatment for the majority of these injuries are summarized below.

a.  Simple fractures of the crown involving little or no dentin.  Treatment:  Smooth the rough edges of the tooth.

b.  Extensive fractures of the crown involving considerable dentin but not the pulp.  Treatment:

(1)  Wash the tooth with warm saline.

(2)  Isolate and dry the tooth.

(3)  Cover the exposed dentin with a zinc oxide-eugenol paste (it is difficult to achieve retention in anterior fractures).  A copper band or an aluminum crown, trimmed and contoured to avoid lacerating the gingiva, may be filled with this paste and placed over the tooth.  An alternative method is to incorporate cotton fibers into a mix of zinc oxide and eugenol (the fibers give additional strength) and place this over the involved tooth, using the adjacent teeth and the spaces between them for retention.  Have the patient bite to be sure neither the bands or the "splint" interfere with bringing the teeth together.

(4)  Have the patient see a dentist as soon as possible.

c.  Extensive fractures involving the dentin and exposed pulp.  Treatment:

(1)  Anesthetize the tooth.

(2)  Isolate and dry the tooth.

(3)  Wash gently with warm saline.

(4)  Cover the pulp and dentin with a mix of calcium hydroxide and dycal (DO NOT USE ZINC OXIDE AND EUGENOL AS IT CAUSES NECROSIS OF THE PULP), allow to harden (if the mix if moistened with water after placement, the hardening will be more rapid).

(5)  The efficiency of this treatment regimen depends on the size of the pulp exposure.  If the exposure is larger than 1.5 mm. consider

extraction. If all you have available is zinc oxide eugenol, you must also consider extraction.

19-5. ACUTE PERIAPICAL (ROOT END) ABSCESS.

    a.  Diagnosis.

        (1)  Patient gives history of repeated episodes of pain that has gradually become more continuous and intense.

        (2)  The accumulating pus causes increased pressure and the tooth will feel "long" to the patient. It will seem to be the first tooth to strike when the teeth are brought together.

        (3)  There is severe pain on percussion. This is a most significant sign. Always begin percussion on a tooth that appears normal and progress to the suspected tooth.

        (4)  Swelling may be present.

        (5)  Malaise, anorexia, and elevated temperature are sometimes noted. If severe, antibiotics should be considered, but only if these signs are present.

        (6)  The gingival tissues around the tooth are often tender and inflamed.

        (7)  An untreated periapical abscess may burrow through alveolar bone and appear as a bright red elevation of the soft tissues in the area.

    b.  Treatment. Drainage usually provides immediate relief from pain. Two methods may be used to accomplish adequate drainage:

        (1)  If the abscess has "pointed," incise the fluctuant area of the soft tissue associated with the acute infection. Local anesthesia is neither necessary nor easy to obtain.

        (2)  Establish drainage from the tooth; stabilize the tooth firmly with the fingers, remove the soft decay with a spoon-shaped instrument until an opening into the pulp chamber is made. Finger pressure on the gingiva near the root of the tooth should force pus out through the chamber opening. Pain will usually subside immediately.

    c.  Untreated acute periapical abscess.

        (1)  The common course of an untreated acute periapical abscess is as follows:

            (a)  Accumulation of pus and destruction of bone at the root end of the tooth.

            (b)  Invasion of the marrow spaces and destruction of trabeculae (suppurative osteitis).

            (c)  Destruction of the cortex and displacement of the periosteum by suppurative material (subperiosteal abscess).

            (d)  Rupture of the periosteum with resulting gingival

swelling (gum boil or parulis).

(e)  Spontaneous drainage by rupture of the parulis.

(2)  This chain of events can usually be halted at any of the stages by removal of the cause.  Extraction is usually indicated.  If treatment is not given, spontaneous drainage, while affording welcome relief to the patient, does not suffice.  The acute process is merely converted to a chronic state that may flare up at any time, especially during periods of lowered resistance.  The spread of the primary periapical abscess is usually in the direction of least resistance.  As a general rule, it may be stated that the cortical bone nearest the abscess site will be the point of breakthrough, but positively identifying the involved tooth by its closeness to the abscess or parulis is an unreliable procedure.  Certainly a tooth should not be extracted without further diagnostic evidence.  The path of progression and the possibility of serious sequelae resulting from further spread of the infectious process is determined by the anatomy of the region.  The following general statements may be made:

(a)  Periapical abscess spread is usually toward the lateral aspect of the jaw.

(b)  If the primary infection involves the palatal root of an upper tooth, the abscess usually drains in the palate (palatal roots are present in the upper molars and the first bicuspids).  Abscesses on all other roots in the maxillary dentin tend to burrow through to the facial side.

(c)  Periapical abscesses developing on the lingual surface of the mandible at a level producing drainage into the mouth are rare.

(d)  Drainage may be extraoral.  A periapical abscess may perforate the cortical bone and produce a pathway for drainage that opens onto a skin surface without involving the oral mucosa.  The external application of heat may promote this untoward result.

(e)  When the spread of a mandibular periapical abscess is directed lingually, the level of bone perforation dictates its course.  If the breakthrough is above the attachments of the muscles of the floor of the mouth, sublingual infection results.  If below these attachments, the avenue of spread is through the facial spaces of the neck, and grave, possibly fatal complications (e.g., Ludwig's angina) may result.

(3)  Treatment.  In more advanced cases, drainage is still essential.  Antibiotics should be administered and their administration continued for several days subsequent to the remission of symptoms.  In soft tissue abscesses, the application of heat is often helpful in localizing the suppuration.  Emergency treatment centers around prevension of serious sequelae by drainage, if indicated, and the maintenance of high blood levels of antibiotics.  It is highy probable that the extraction of the offending tooth will be necessary, but it is preferable to wait until the acute symptoms have subsided.

19-6.  PERIODONTAL ABSCESS.

a.  Diagnosis.  A deep, throbbing, well-localized pain and tenderness of the soft tissues surrounding the tooth are characteristic.  The patient frequently complains that the involved tooth seems elevated in its socket.

This acute suppurative process occurs in the periodontal tissues alongside the root of a tooth and involves the alveolar bone, periodontal ligament, and gingival tissues. It usually presents the following signs and symptoms:

  (1)  Redness and swelling of the surrounding gingiva.

  (2)  Sensitivity of the tooth to percussion.

  (3)  Mobility of the tooth.

  (4)  Cervical lymphadenopathy.

  (5)  General malaise and elevation of temperature.

     b.  Etiology.  This condition results from irritation from a foreign body, subgingival calculus (tartar, hard calcium deposits on the teeth) or local trauma, and subsequent bacterial invasion of the periodontal tissues.

     c.  Treatment.

  (1)  Carefully probe the gingival crevice to establish drainage and locate the foreign body.

  (2)  Spread the tissues gently and irrigate with warm water to remove remaining pus and debris from the abscess area.

  (3)  Remove any foreign bodies.

  (4)  Instruct the patient to use a hot saline mouth rinse hourly.

19-7.  ACUTE NECROTIZING ULCERATIVE GINGIVITIS (Vincent's infection, trench mouth).

     a.  Diagnosis.  Constant gnawing pain and marked gingival sensitivity are usually the outstanding complaints.  These subjective symptoms are accompanied by pronounced gingival hemorrhage, fetid odor, foul metallic taste, general malaise, and anorexia.  Necrosis and ulceration are the principal characteristics of this painful inflammatory disease of the gingival tissues.  Necrotic lesions commonly appear between the teeth. These are craterlike ulcerations covered by a grayish pseudomembrane. Cervical lymphadenitis and elevation of temperature may develop after the onset of acute oral symptoms.  Untreated lesions are destructive with progressive involvement of the gingival tissues and underlaying structures.

     b.  Etiology.  Although it was felt for many years that fusospirochetal organisms were solely responsible, the precise cause has not been proven.  It is considered to be an infection arising as a result of the action of ordinarily harmless surface parasites exposed to an altered environment.  General health, diet, fatigue, stress, and lack of oral hygiene are the most important precipitating factors.  This disease is not considered to be transmissable; however, the fusospirochetal organisms are very virulent.

     c.  Treatment.  The primary problem in therapy is the establishment of good oral hygiene.  Simple emergency treatment is outlined as follows:

  (1)  First day.

(a)  Wear surgical or exam gloves when working on this if possible.

(b)  Swab the teeth and gingiva thoroughly with a 1:1 aqueous solution of 3% hydrogen perioxide on a cotton-tipped applicator twice.

(c)  Instruct the patient to rinse his mouth at hourly intervals with this same solution.  Issue the patient one pint of hydrogen peroxide.  Caution him not to use this treatment for more than 2 days (due to possibility of precipitating a fungal infection).

(d)  Place the patient on an adequate soft diet and advise a copious fluid intake.

(e)  Have patient return in 24 hours.

(2)  Second day.  Patient will be much more comfortable.

(a)  Using a soft toothbrush soaked first in hot water, clean the patient's teeth without touching the gingiva.

(b)  Maintain the hourly hydrogen peroxide mouthwash regimen.

(c)  Have patient brush with a soft toothbrush soaked in hot water every hour.

(d)  Have patient return in 24 hours.

(3)  Third day.  Patient is essentially free of pain.

(a)  Clean patient's teeth as before.

(b)  Floss between all teeth.

(c)  Discontinue hydrogen peroxide mouthwash regimen.

(d)  Have patient brush 3-4 times a day.

(e)  Tell patient to floss once a day.

(4)  The above steps will suffice for the management of the typical acute case.  After treatment, the acute form subsides and the chronic phase ensues.  Although clinical symptoms are minimal, tissue destruction continues until further corrective measures are completed. Definitive care consists of cleaning and scaling of the teeth, instruction in oral hygiene and, in some cases, recontouring of the tissues involved in the infection.  Unless the patient develops systemic involvement, antibiotic therapy should not be instituted.  Antibiotic lozenges should never be employed in the management of this disease.  As in other oral disorders, the use of silver nitrate or other causitcs is definitely contraindicated.

d.  Remarks.  Lesions similar to those of acute necrotozing ulcerative gingivitis frequently appear in patients suffering from blood dyscrasias or vitamin deficiencies.  Any case of gingivitis that does not respond well within 24 hours requires hematological analysis.

19-8. HERPETIC LESIONS (COLD SORES, FEVER BLISTERS).

a. Diagnosis. Intense pain is the most frequent symptom when the fully developed herpetic ulcer is present. Itching, burning, and a feeling of tissue tautness are characteristics in the early stages. Oral herpetic lesions usually appear as small, localized ulcerations, but extensive involvement is occasionally seen. The vesicular stage (presence of fluid-containing "blisters" characteristic of involvement of the lips) is seldom seen with the mouth. Intraoral vesicles are quickly ruptured and the hepatic lesion then appears as a small eroded area with a bright red, flat or slightly raised border. In later stages, the lesion becomes covered with an all white plaquelike mass of epithelial cell fibrin and debris. Generalized herpetic infections produce large aras of fiery red, swollen, and extremely painful oral mucosa. It is in this type that systemic symptoms are pronounced.

b. Etiology. Lesions are due to the herpes simplex virus. This virus persists throughout the lifetime of the patient in areas near the site of the primary infection. In an otherwise healthy mouth, a degree of lowered resistance must be present in the oral structures for the virus to produce its effects. Predisposing factors include emotional stress, the common cold and other upper respiratory infections, gastrointestinal disorders, nutritional deficiencies, food allergies, and traumatic injuries to the oral mucosa. In females, menstruation and pregnancy often seem to trigger this process.

c. Treatment. Treatment is directed at the symptoms. Antibiotics are ineffective, but in severe cases they may prevent secondary infection. Fluids should be forced to prevent dehydration. Spices, spirits, and smoking should be avoided since they irritate the already painful lesions. Oral hygiene must be maintained.

d. Remarks. Healing usually occurs in about 2 weeks. Scar formation or serious sequelae are exceedingly rare. The primary infection, usually seen during childhood, produces a much more extensive and serious oral involvement than do the later episodes. Lesions are usually larger and more numerous and the pain is consequently greater. Because of the pain, children frequently refuse to eat or drink and dehydration may result.

19-9. PERICORONITIS.

a. Diagnosis. Marked pain in the area of a mandibular third molar is the most constant complaint. Acute inflammation is present in tissue flaps over partially erupted teeth. The clinical picture is that of a markedly red, swollen, suppurative lesion that is very tender and often accompanied by pain radiating to the ear, throat, and the floor of the mouth. The opposing (upper) wisdom tooth may impinge on the swollen flap of tissue thus making chewing virtually impossible. Fever and general malaise are often present. In addition, there may be spasm of the masticatory muscle on the affected side. Involvement of the cervical lymph nodes is common. Principal etiologic factors include trauma from opposing teeth, accumulation of food and debris, and bacteria and their products.

b. Treatment.

(1) Wrap the tip of a blunt instrument with a wisp of cotton. Dip the cotton in 3% hydrogen peroxide and carefully clean the debris from

beneath the tissue flap; pus may be released.

(2) Flush the area using warm saline solution.

(3) Instruct the patient to use a hot saline mouth rinse hourly.

(4) Prescribe an adequate soft diet.

(5) Repeat this treatment at daily intervals until the inflammation subsides.

(6) Stress that oral hygiene must be maintained.

(7) Extraction of the opposing molar must be considered if the inflammation does not subside.

NOTE: Antibiotic therapy should be limited to the treatment of systemic symptoms. Extraction of the offending tooth is usually necessary. Since the inflammatory process tends to recur, definitive dental treatment will be necessary.

19-10. DENTAL ANALGESIA.

a. Maxillary.

(1) Infiltration will provide adequate analgesia of the maxillary teeth. (Analgesia - blocking of pain impulses. Anesthesia - blocking of all nerve impulses.)

(2) Technique. Both facial and palatal injections must be given for maxillary extraction.

(a) Facial injection (see illustrations below).

1. Insert the needle into the mucobuccal fold directly above the tooth.

2. Advance the needle upward about three-eighths of an inch until the needle gently contacts bone (this should approximate the root end).

3. Aspirate to insure that the needle has not entered a blood vessel.

4. Slowly deposit three-fourths of the cartridge's contents.

(b) Palatal injection (see illustrations below).

1. Insert the needle one-half of an inch above the gingival (gum) margin of the tooth.

2. Deposit 3-4 drops of solution - DO NOT BALLOON THE TISSUE.

NOTE: The palatal injection is very painful.

b. Mandibular (Inferior alveolar). Conduction analgesia

19-9

supplemented by infiltration is the method of choice in anesthetizing the lower teeth. The inferior alveolar nerve is blocked as it enters the mandibular foramen on the medical aspect of the ramus of the mandible. This foramen is located midway between the anterior and posterior borders of the ramus and approximately one-half of an inch above the biting surface of the lower molars. The width of the ramus at this level can be estimated by placing the thumb on the anterior surface of the ramus (intraorally) and the index finger on the posterior surface extraorally. The inferior alveolar and lingual nerves are anesthetized by a single injection.
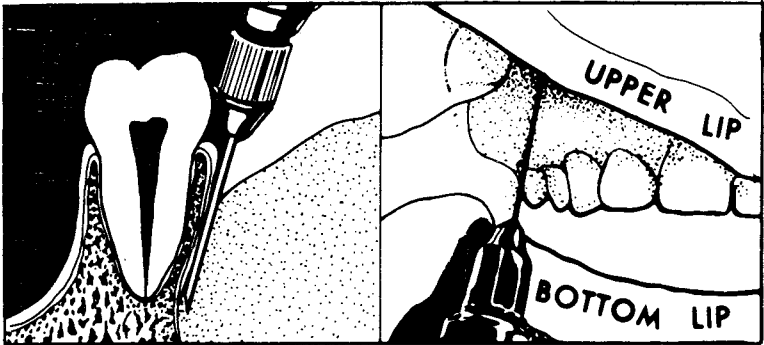


FACIAL INJECTION.
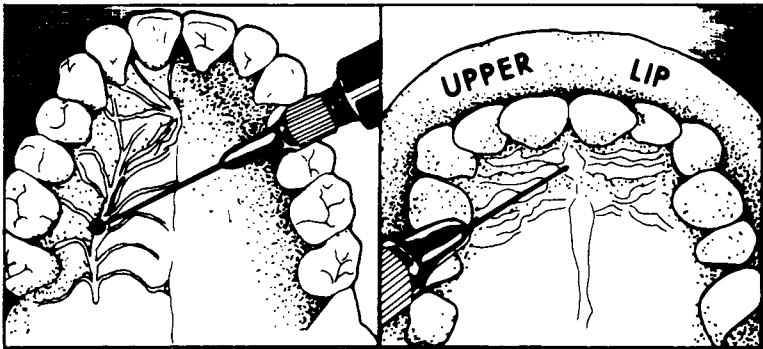


PALATAL INJECTION.

(1) Place the index finger on the biting surface of the lower molars so that the ball of the finger will contact the anterior border of the ramus. The fingernail will then be parallel to the midline.

(2) Place the barrel of the syringe on the lower bicuspids on the side opposite of the side to be anesthetized.

(3) Insert the needle into the tissue of the side to be

anesthetized in the apex of the V-shaped, soft tissue depression about one-half of an inch ahead of the tip of the finger on a line horizontally bisecting the fingernail.

(4) Advance the needle to contact the medical surface of the ramus. A 1-inch soft tissue penetration will usually suffice to position the needle point in the area of the mandibular foramen.

(5) Slowly deposit approximately two-thirds of the cartridge contents.

(6) Swing the barrel of the syringe to the side of the mouth being injected (leaving the needle in the position described in (4) above) and inject the rest of the cartridge contents while withdrawing the needle. This should anesthetize the lingual nerve.
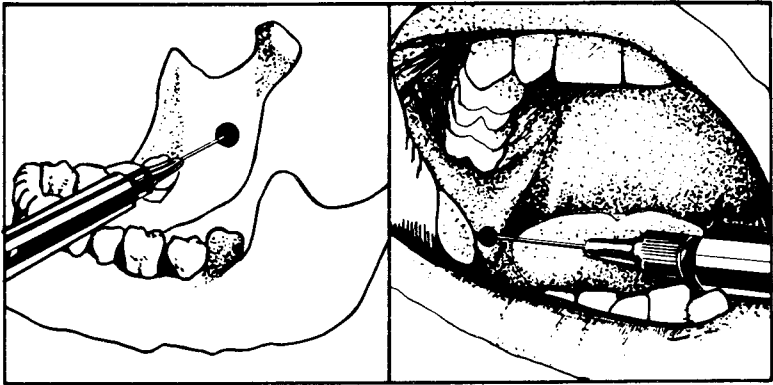


MANDIBULAR INJECTION.

(7) Anesthesia of the area is completed by a long buccal injection (see illustration below). Insert the needle in the mucobuccal fold at a point just anterior to the first molar. Gently pass the needle held parallel to the body of the mandible, with the bevel down, to a point as far back as the third molar, depositing the solution slowly as the needle is being advanced through the tissue.

(8) After a 5-minute interval, the results of the injection are evaluated by checking the following symptoms:

(a) Inferior alveolar nerve (supplies lower teeth, alveolar bone up to the midline).

1. A sensation of swelling and numbness extending to the midline of the lower lip on the injected side.

2. Insensitivity of the facial gingival tissue extending to the midline on the injected side.

19-11

      (b)  Lingual nerve.

          1.  A swollen numb sensation extending to the midline of the tongue.

          2.  Insensitivity of the lingual gingival tissue.

      (c)  DO NOT ATTEMPT EXTRACTION UNTIL THE SIGNS DESCRIBED ABOVE HAVE APPEARED.

19-11.  TOOTH EXTRACTION.

    a.  This section describes only one extraction technique.  Although many types of extraction forceps are manufactured, the removal of any erupted tooth can usually be accomplished with one of two instruments:  The Maxillary Universal Forceps (150) or the Mandibular Universal Forceps (151).
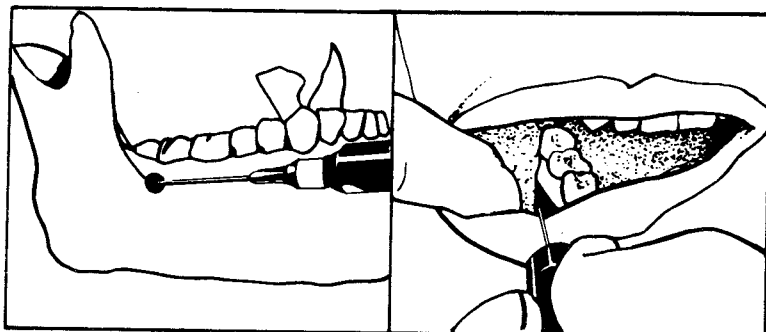


LONG BUCCAL INJECTION.

    b.  Technique.  Break the attachment of the gingival tissue to the tooth by forcing a blunt instrument (Periosteal Elevator, Woodson Plastic Instrument, etc.) into the crevice between the tooth and the gingiva, all the way around the tooth.  The tooth-tissue attachment should be broken to the level of the alveolar bone.

        Use the free hand to guide the beaks of the forceps under the gingival margin on the facial and lingual aspects of the tooth and to support the alveolar process.  Apply pressure toward the root of the tooth to force the tips of the forceps as far down on the root as possible. Slowly rock the tooth with progressively increasing pressure in a facial-lingual direction.  This force is used for the loosening of teeth with more than one root (molars and upper first bicuspids).  Single-rooted teeth are loosened by combining this rocking motion with a rotary force. When considerable mobility has been established, deliver the tooth by exerting gentle traction.  Note the direction in which the tooth tends to move most easily and follow this path for delivery.  Inspect the extracted tooth to determine if the roots have been fractured.  After the extraction has been completed, compress the sides of the empty socket (this repositions the bone that has been sprung by the extraction force) and

place a folded dampened sponge or 2x2 over the wound. Instruct the patient to maintain light biting pressure on this compress for 20 minutes. Repeat if necessary to control hemorrhage. Caution the patient NOT TO RINSE the mouth for at least 12 hours since this may disturb the clot.

19-12. INJURIES OF THE JAWS.

    a. General. The immediate treatment of facial trauma consists of the establishment of an airway, the control of hemorrhage, the treatment of shock, and the evaluation of neurologic findings. These basic measures MUST BE CONSIDERED FIRST. Although diagnosis is difficult when edematous distortion and muscular trismus are present, a thorough clinical examination should include inspection and palpation of the oral regions for the following:

        (1) Wounds, swelling, and discoloration.

        (2) Pain, tenderness, crepitus, and mobility at suspected fracture sites.

        (3) Facial asymmetry.

        (4) Trismus.

        (5) Abnormal mandibular excursions.

        (6) Altered biting relationship of the upper and lower teeth.

        (7) Segmental alveolar fractures. Exert pressure upon each individual tooth to determine the integrity of the underlying alveolar bone.

    b. Dislocations of the mandible.

        (1) The usual type of dislocation of the mandible is bilateral and the condyles are displaced anteriorly. The mouth is locked open with the chin protruded. Trismus is present and speech is difficult. In the unilateral type (very rare), the chin is deviated away from the side of the dislocation. Reduction of the dislocated jaw is normally accomplished without anesthesia. Narcotics are effective in relieving pain and apprehension and thereby prompt relaxation of the jaw muscles, but restraint must be exercised in their use. In the more resistant cases, general anesthesia may be indicated. Repositioning of the dislocated mandible is accomplished in the following manner:

            (a) Wrap the thumbs with several thicknesses of gauze or towel. This provides protection against snap closure of the mandible.

            (b) Place the thumbs lateral to the molar teeth to prevent injury to the thumbs and extend the fingers to grasp the under surface of the mandible. (The thumbs may also be placed on the biting surfaces of the lower molar teeth so that more pressure can be exerted, but when the jaw snaps closed you can get bitten.)

            (c) Exert DOWNWARD pressure with the thumbs to bring the condyle of the mandible below the articular eminences. The fourth and fifth fingers may be used to exert an upward pressure on the point of the chin.

       (d)  Gently but firmly force the mandible FORWARD, then BACK.  This will usually return the condyles to normal position.

       (e)  Caution the patient to avoid excessive opening of the mouth for several weeks.

       (f)  Prescribe a soft diet.

       (2)  Normally the pain following repositioning continues for about 72 hours.  Analgesics should adequately control this pain.  If marked pain persists or if there is a tendency toward recurrence of dislocation, immobilization is indicated.  This may be effected by head bandages.

    c.  Mandibular fractures.

       (1)  Mandibular fractures must be differentiated from dislocations of the jaw because of the great difference in treatment.  Some of the features of fractures are:

       (a)  Pain.

       (b)  Abnormal bite relationship between upper and lower teeth; they come together normally on one side and do not touch on the other when the jaws are closed.

       (c)  Crepitus.

       (d)  Gross displacement of segments of the jaws.

       (2)  Once a mandibular fracture has been diagnosed, the patient should be evacuated in a face-down or side position to prevent aspiration of blood, saliva, vomitus, etc.  The use of head bandages to immobilize the jaws is not recommended since the backward force exerted may push the tongue (or other soft tissue) back to obstruct the airway.  In addition, head bandages make it difficult for a patient to vomit without aspiration.  Reducing the fracture at this time is not suggested since the harm done may exceed any benefits derived.  If evacuation is not possible and you have to keep the patient, wait until the patient's condition is stable, then line up the upper and lower teeth using wire sutures (0 silk if wire is not available).  Wire the upper and lower teeth together as follows:

       (a)  Form a small loop in the center of the wire and wrap the wire in a figure 8 around two teeth with small loop centered between the teeth.

       (b)  Repeat this in at least four positions on the top teeth and the same number on the lower teeth, insuring the loops on top and bottom are opposite each other.

       (c)  Wire the two loops (in each of the four positions) together.  This will hold the jaw in position.  (See illustration below.)
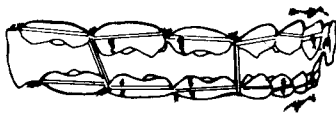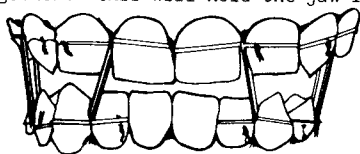
The wires will have to remain in place from 3-6 weeks, and the patient will have to be placed on a liquid diet during this time. After the wires are removed, keep the patient on a soft diet for a couple of weeks; then gradually return him to a normal diet.

CHAPTER 20

PREVENTIVE MEDICINE (PM)

20-1. THE MEDIC'S ROLE IN PREVENTIVE MEDICINE.

    a. Plans preventive medicine programs.

    b. Advises and recommends preventive medicine measures to the commander.

    c. Supervises or performs preventive medicine measures.

    d. Insures that preventive medicine programs are implemented properly.

    e. Teaches and supervises personnel in preventive medicine measures.

20-2. PERSONAL HYGIENE.

    a. Foot care.

        (1) Keep feet clean (dry well after bathing).

        (2) Massage and powder twice daily if possible.

        (3) Change socks daily or when wet.

        (4) Keep socks and footgear in good repair.

        (5) Keep toenails short with squared off cut.

    b. Showering and hand washing.

        (1) Shower as often as possible to avoid skin disease.

        (2) Wash hands after using latrine and before eating.

        (3) If unable to bathe, wash face, underarms, groin, feet, etc.

        (4) Desitin, A&D Ointment, or cornstarch in groin and between buttocks helps control rash.

20-3. INDIVIDUAL PROTECTIVE MEASURES.

    a. Clothing. The combat uniform worn fully and properly is the best means of initial protection and first line of defense available. It should be worn loosely to permit ventilation and must be worn with the pants bloused into the boots, shirt tail tucked into pants, sleeves down and buttoned to provide protection against insects such as ticks and to lessen exposure to mosquitoes, sandflies, and other disease carriers.

    b. Use of M1960-Clothing Repellent (DEET). The full uniform impregnated with M1960 repellent provides additional protection against arthropods. Do not impregnate underclothing and socks. The M1960 repellent kills mites and ticks and repels mosquitoes and other vectors. To mix, use a large container (approximately 15 gallons) and a long stick for stirring; add 1 gallon of DEET to 11 gallons of water. The ratio must

remain correct. Soak and saturate the outer clothing only. Wring out excess solution and allow the uniform to dry prior to wearing. This procedure must be repeated each time the uniform is laundered.

c. Individual insect repellent applied to exposed skin areas provides good protection against all insects. Kerosene applied to neck, wrists, and legs at the boot tops will prevent infestation from chiggers, mites, etc.

d. Lindane dust or sulfa powder provides good protection against mites, chiggers, and lice when other repellents are not available.

e. Aerosol insecticides sprayed into containment areas such as living quarters, tents, and bed nets are highly effective against flying insects.

f. If infestation of lice, chiggers, etc., should occur, bathing with a strong soap will rid the individual of the insects. Additionally, clothing must be removed and laundered to prevent reinfestation.

g. Good personal hygiene and protective measures are the basic lines of defense against disease.

20-4. COLLECTIVE PROTECTIVE MEASURES - FIELD SANITATION AND CHEMICAL CONTROL.

a. Pesticides (chemical control) can be valuable aids in the control of arthropods, but these are only to supplement, not replace, good field hygiene and individual measures of protection. Pesticides are poisonous and can be more dangerous than helpful to the environment and the individual if misused. Pesticides can be inhaled or absorbed through the skin if the user is improperly trained to protect himself through the use of respirators, protective masks, gloves, etc.

(1) Classification of pesticides.

(a) Stomach poisons (e.g., lead arsenate) must be ingested by the insect to be effective.

(b) Contact poisons (e.g., DDT, lindane, pyrethrum, and Diazinon) kill by merely coming in contact with the insect. These can be quick kill, short life or residual, long term kill expectancy. NOTE: DDT, lindane, pyrethrum, and Diazinon are either not available in the US or under the scrutiny of US Standards (EPA, FDA, USDA, etc.). However, they may still be accessible for export or available in the OCONUS area of operation. Care must be used in all applications of pesticides. You may find agents such as DDT, if available, very valuable in delousing operations. Do not hesitate to use pesticides in a cautious manner even though they have been banned in the US.

(c) Fumigants kill through the insect's respiratory system and are very dangerous to humans, normally requiring special handling and training; they are not recommended for the use of the medic in any situation.

(2) Toxicity. When you use pesticides, always read the instructions and follow those instructions to prevent harm to yourself and others or to the environment. Never use any pesticide marked "concentrate"; it must be diluted in accordance with its nature and handled only by specially trained personnel. When in doubt, avoid the substance or

contact the group preventive medicine personnel.

b. Equipment available for issue and use in chemical control and in application of pesticides are the hand duster for use with dusts such as DDT and lindane and the hand pressure sprayer for use with liquids.

20-5.  FIELD DISINFECTION OF WATER (PURIFICATION).

a.  Directions for the use of iodine water purification tablets call for adding one tablet to a quart canteen of clear water, two tablets if cloudy.  Recent studies indicate that one tablet may not guarantee complete destruction of Giardia cysts in clear, very cold water.  Giardia, an intestinal protozoan parasite, is found worldwide, particularly in cold water.  Therefore, two tablets will be used in very cold water, whether cloudy or clear.

b.  Canteen (1 quart):

(1)  Concept:  Any water can be collected in a soldier's canteen and made safe using iodine tablets.  (Water Purification Tablets, NSN 6850-00-985-7166.)

(2)  Procedures:

(a)  CHECK THE WATER.  (Use one tablet if clear; use two if cloudy or cold.)

(b)  ADD IODINE TABLETS.  (Use only steel gray; don't use red or white.)

(c)  WAIT 5 MINUTES.  (Allow time for the tablets to dissolve.)

(d)  SHAKE THE CANTEEN.  (Mix the contents well.)

(e)  DISINFECT THREADS.  (Loosen the cap; turn canteen upside down.)

(f)  WAIT 30 MORE MINUTES.  (Allow time for the iodine to kill.)

(3)  Alternate methods of disinfecting if iodine tablets are not available.

(a)  Boil water.  Bring to a boil for at least 15 seconds.

(b)  Iodine (tincture).  Add five or more drops to each canteen.

(c)  Bleach (Clorox).  Add two or more drops to each canteen.

(d)  Chlorine ampules.  Break one ampule into a canteen cup; fill cup with water to the bottom rivet and stir; pour half a capful of the slurry into each canteen and wait 30 minutes.

c.  Water bag (lister bag - 36 gallons).

(1)  Concept:  Any water can be poured into a lister bag and made safe using chlorine ampules.  (Chlorination Kit, Water Purification, NSN 6850-00-270-6225.)

(2)  Procedure:

(a)  DISSOLVE THREE AMPULES.  (Use a canteen cup as a bowl.)

(b)  POUR INTO LISTER BAG.  (Stir the bag with a clean stick.)

(c)  FLUSH ALL THE TAPS.  (Let each run for several seconds.)

(d)  WAIT 10 MINUTES.  (Allow time for chemical reaction.)

(e)  CHECK THE RESIDUAL.  (Use the plastic test tube in the kit.)

1.  Crush one "OT" tablet in the metal cap.

2.  Dump the resulting powder into the plastic test tube.

3.  Flush the tap from which you are going to take the sample.

4.  Fill test tube with water to bottom of the yellow band.

5.  Compare colors:  If the water is at least as dark as the yellow band, proceed to step 6; if the water is lighter, more chlorine is needed.  Repeat steps 1 through 5 using one or more additional chlorine ampules.

6.  WAIT 20 MORE MINUTES.  (Allow time for the chlorine residual to kill.)  Check residual again before drinking; if chlorine residual is < 5 ppm., repeat steps 1-5.

d.  Water cans (5 gallon).

(1)  Concept:  Water in standard 5-gallon cans can be made safe using chlorine ampules.  (Chlorination Kit, Water Purification, NSN 6850-00-270-6225.)

(2)  Procedure:

(a)  DISSOLVE ONE AMPULE.  (Use a canteen cupful of water.)

(b)  POUR HALF OF CUP INTO CAN.  (Remainder can be poured into a second can.)

(c)  DISINFECT THE THREADS.  (Loosen cap; turn can upside down and shake; then retighten.)

(d)  WAIT 30 MINUTES.  (Allow time for chlorine to kill.)

e.  Water trailer (400 gallon).

(1) Concept: If the unit's field sanitation team tests the trailer and fails to find a measurable chlorine residue (any degree of yellow is acceptable), the water in the trailer can be made safe using chlorine powder. (Calcium hypochlorite, 6-oz. jar, NSN 6810-00-255-0471) or Chlorination Kit, Water Purification, NSN 6850-00-270-6225.)

(2) Procedure:

(a) DISSOLVE ONE SPOONFUL. (Use a mess kit spoon and a canteen cup.)

(b) POUR INTO TRAILER. (Stir with a clean stick.)

(c) FLUSH TRAILER TAPS. (Let each run for several seconds.)

(d) WAIT 10 MINUTES. (Allow time for chemical reaction.)

(e) CHECK RESIDUAL. (Use the plastic test tube from chlorination kit.)

<u>1</u>. Crush one "OT" tablet in the metal cap.

<u>2</u>. Dump the resulting powder into the plastic test tube.

<u>3</u>. Flush the tap from which you are going to take the sample.

<u>4</u>. Fill test tube with water to bottom of the yellow band.

<u>5</u>. Compare colors: If the water is at least as dark as the yellow band, proceed to step 6; if the water is lighter, more chlorine is needed. Repeat steps 1 through 5 using half a spoonful of powder.

6. WAIT 20 MORE MINUTES. (Allow time for the chlorine residual to kill.) Check residual again before drinking; if chlorine residual is < ppm., repeat steps 1-5.

f. Remarks.

(1) The concept that any water can be made "safe" by chlorination is a misconception. Chlorinating potentially contaminated water does not necessarily make it safe due to amoebic cysts. Filtration is a practical means of removing cysts from the water; however, this may be impractical. Boiling water to a hard roll for at least 15 seconds is another means of making the water safe from amoebic cysts as this action will kill the cysts.

(2) Chlorination, when performed properly, will make water "safe" in regards to killing disease-causing bacteria, such as E. coli; however, only filtration or boiling can kill or remove the amoebic cysts from the water source. All water from unknown sources must be considered dangerous and contaminated. All precautions for the treatment of the water must be utilized.

(3) POL containers or water containers that have been contaminated with POL must not be used for consumable water.

(4) Always check the water for chlorine residual, regardless of the source. When the residual is adequate, no disinfection is necessary. However, if the residual is low, disinfect the water using the procedures described for each container. A minimum of 5 ppm. chlorine residual is required for field water supplies.

20-6. WATER SOURCES.

a. Surface water (lakes, ponds, streams, rivers). Although this source is the least desirable, it is most plentiful and easily accessible. Knowing the best sites to choose to avoid excessive polution and the proper methods of water treatment is the best prevention of waterborne disease. Sometimes water may be unpalatable due to odors or unpleasant taste, but it can be made potable and it may prevent death through dehydration if it is properly treated.

b. Ground water. Wells are usually the most desirable source; however, care must be taken to insure no pollution has been introduced by dumping animal carcasses, garbage, feces, etc. All water of unknown origin must be considered polluted and must be treated.

c. Precipitation. Even with rain and snow (often least common and least dangerous when fresh), precautions must be taken to avoid introducing disease pathogens to the individual; therefore, rain and snow require treatment to the recommended level.

20-7. WASTE DISPOSAL.

a. The term "wastes" includes all types of refuse resulting from the living activities of humans or animals: human wastes (feces and urine); liquid wastes (wash, bath, and liquid kitchen wastes); garbage; and rubbish.

b. The methods that should be used to dispose of wastes depend upon the situation and the location. Burial and burning are the methods most commonly used in the field.

c. Large quantities of all types of wastes, liquid and solid, are generated each day under field conditions. These materials must be removed promptly and thoroughly; otherwise, the camp or bivouac will quickly become an ideal breeding area for flies, rats, and other vermin. Filth-borne diseases such as dysentery (amebic and bacillary), typhoid, paratyphoid, cholera, and plague could become prevalent.

d. Disposal of human wastes:

(1) The devices for disposing of human wastes in the field vary with the situations.

(a) When on the march, each person uses a "cat-hole" latrine during short halts. It is dug approximately 1-foot deep and is completely covered and packed down after use.

(b) In temporary camp of 1 to 3 days the straddle trench is most likely to be used unless more permanent facilities are provided for

the unit.

(c)  In temporary camps deep pit latrines and urine soakage pits are usually constructed.  Until such time as the construction of deep pit latrines can be completed, straddle trench latrines are used.  Where the construction of deep pit latrines is not practicable, other types of latrines are used.

(2)  Rules common to the construction, maintenance, and closing of latrines.

(a)  In determining the type of latrines to be constructed, consider the length of stay, the water level, and the soil conditions.  To protect water from contamination, do not extend the depth of a latrine pit or trench below the underground water level.

(b)  In determining the location within the camp area for construction of latrines, consider first the protection of food and water from contamination and, secondly, the accessibility to the users.

1.  To protect food and water from contamination, select a location that is at least 100 yards from the unit mess and 100 feet from the nearest water source and that drains away from all water sources.

2.  Choose a location that is accessible to the users and reasonably near the edge of the camp.

(c)  Sufficient latrines should be constructed to serve at least 8 percent of the personnel at one time.

(d)  After the latrines have been completed, construct the necessary protective and hygienic devices.

1.  Place canvas or brush screens around the latrines or tents over them.  In a cold climate the shelters should be heated, if possible.

2.  To prevent surface water from flowing into the shelters, dig drainage ditches around them.

3.  In each latrine shelter, provide toilet paper on suitable holders with tin cans for covering the toilet paper to keep it from getting wet during bad weather.

4.  Install a simple, easily operated handwashing device just outside each latrine shelter.  These devices should be kept filled with water at all times so that each individual can wash his hands after he uses the latrine.

5.  At night extend cords from trees or stakes to the latrines to serve as guides.

(e)  Police the latrines properly and maintain a good fly-control program in the entire camp area to prevent fly breeding and to reduce odors.

1.  Keep the lids to the latrine seats closed and all

cracks sealed.

        2. Scrub the latrine seats and boxes with soap and water daily.

        3. Spray the inside of the shelters with a residual insecticide twice weekly. If a fly problem exists, also spray the pit contents and the interior of the boxes twice weekly with a residual insecticide. Using lime in the pits or burning out the pit contents, except in burn-out latrines, is not effective for fly or odor control; these methods, therefore, are not recommended.
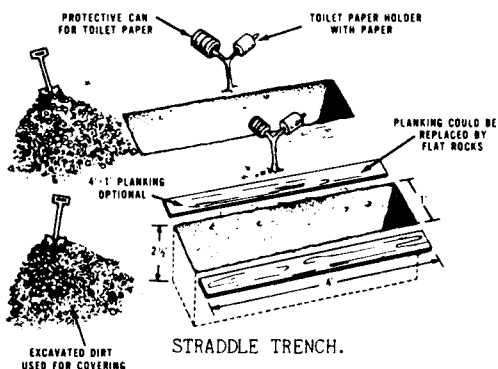
        (f) When a latrine pit becomes filled with wastes to 1 foot from the surface or when it is to be abandoned, remove the latrine box and close the pit as follows:

        1. Using an approved residual insecticide, spray the pit contents, the side walls, and the ground surface extending 2 feet from the side walls.

        2. Fill the pit to the ground level with successive 3-inch layers of earth, packing each layer down before adding the next one; then mound the pit over with at least 1 foot of dirt and spray it again with insecticide. This prevents any fly pupa, which may hatch in the closed latrine, from getting out.

        (3) Cat hole latrine. Primarily used when a unit is "on the march or for short-term duration" (1 day). It is 6-12" deep and is covered after use.

        (4) Straddle trench latrine. Used for 1 to 3 day bivouac, in nonrocky or nonfrozen soil. Construct 1' wide, 2 1/2' deep, and 4' long. Accommodates two men. Parallel trenches at least 2' apart. Excavated earth is used promptly to cover excreta.



STRADDLE TRENCH.

        (5) Deep pit latrine (illustrated on next page). Used in temporary camps; not used in rocky or frozen soil or where the water table is high. Construct 2' wide, 7 1/2' long, and 1' of depth for each week of use. Add 1' of depth for dirt. Maximum depth 6'. Cover with latrine box. Accommodates four men. Wash latrines with soap and water daily.

        (6) Mound latrine. Used when the water table is high or in

the unit.

(c) In temporary camps deep pit latrines and urine soakage pits are usually constructed. Until such time as the construction of deep pit latrines can be completed, straddle trench latrines are used. Where the construction of deep pit latrines is not practicable, other types of latrines are used.

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5. At night extend cords from trees or stakes to the latrines to serve as guides.

(e) Police the latrines properly and maintain a good fly-control program in the entire camp area to prevent fly breeding and to reduce odors.

1. Keep the lids to the latrine seats closed and all

cracks sealed.

_2_. Scrub the latrine seats and boxes with soap and water daily.

_3_. Spray the inside of the shelters with a residual insecticide twice weekly. If a fly problem exists, also spray the pit contents and the interior of the boxes twice weekly with a residual insecticide. Using lime in the pits or burning out the pit contents, except in burn-out latrines, is not effective for fly or odor control; these methods, therefore, are not recommended.

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_1_. Using an approved residual insecticide, spray the pit contents, the side walls, and the ground surface extending 2 feet from the side walls.

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(6) Mound latrine. Used when the water table is high or in

rocky soil. Build mound 6' wide and 12' long to accommodate a latrine box. Pit is built in mound. Pits have same dimensions as a deep pit latrine. Reinforce walls (if necessary) to avoid cave-ins.

(7) Burn-out latrine (illustrated below). Used in rocky/frozen soil or when the water table is high. Construct with 55-gallon drum; bury half or cut it in half. Cover with flyproof wooden seat. For feces only (not for urinating), burn out daily or when half full. (Use 1 qt. gas to 5 qt. diesel or kerosene.) Use two latrines (one in use, while other is burned).

Burn until only ash remains, and bury ash.
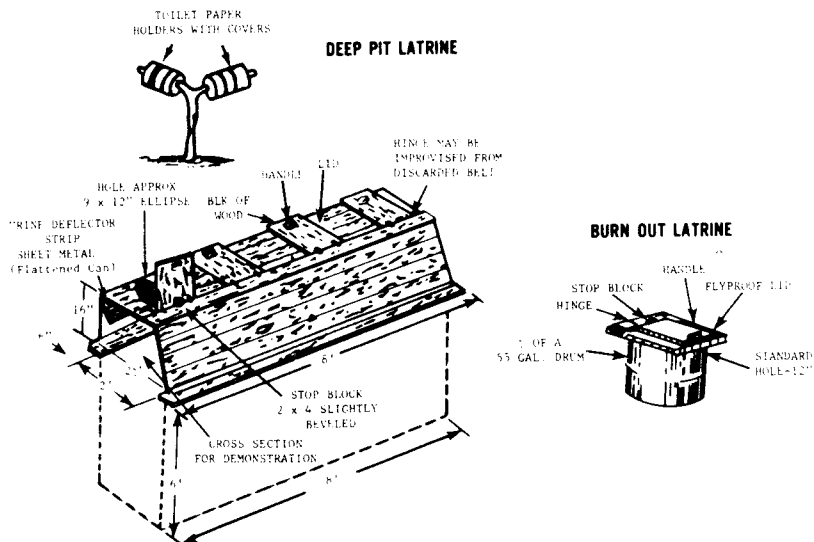


(8) Urinals.

(a) Construct one urinal per latrine facility or enough to serve 5% of the personnel at one time.

(b) Urine soakage pit. Construct 4 cubic feet in length. Fill with rocks, bricks, broken glass, or similar items. Place 1" pipes, 36" long, at each corner 8" deep into pit. Place funnels at the top of the pipes.

SMALL STONES

1 INCH PIPE

26"

8

FUNNEL
(METAL OR
TAR PAPER)

## URINE SOAKAGE PIT

LARGE STONES
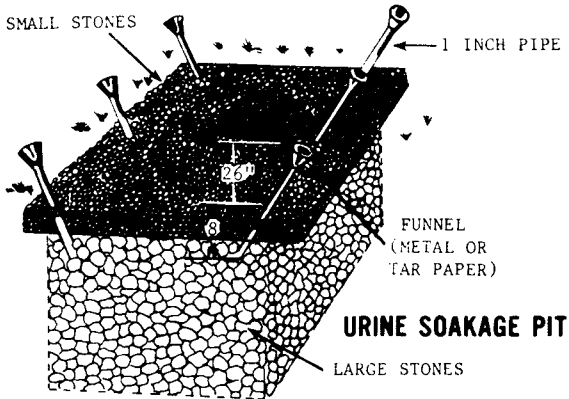
(c) Urine trough. Used when wood is more available than pipe. Allow 10' of trough/100 men. Construct V- or U-shaped trough with metal or tar paper lined wood. Place splash board down the center of trough. Drain into soakage pit or deep pit latrine.

## TROUGH URINAL



SOAKAGE PIT

TROUGH SLOPES
TOWARD SOAKAGE PIT

1'

10
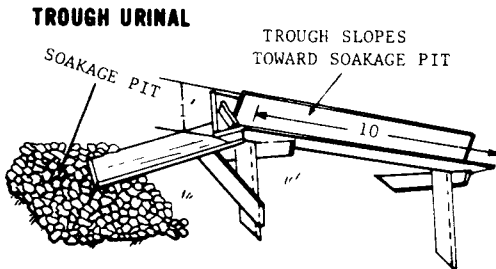
e.  Wash, bath, and liquid kitchen wastes:

(1)  In the field, wash, bath, and liquid kitchen wastes are disposed of in the soil usually by means of either soakage pits or soakage trenches. In order for the soil to absorb these liquids, the grease and soap as well as any solid particles must first be removed; therefore, each soakage pit or trench used for disposing of wash and liquid kitchen wastes must have a grease trap. In places where heavy clay soil prevents the use of soakage pits or trenches, evaporation beds may be used if the climate is hot and dry.

(2)  Soakage pits. In a temporary camp, a soakage pit 4 feet square and 4 feet deep normally will be adequate to dispose of liquid kitchen waste for 200 persons. If the troops are to remain in the camp for 2 weeks, two pits should be constructed for disposal of liquid kitchen waste; each pit should be used on alternate days, thus lessening the possiblity of clogging. Each device provided for washing and bathing must also have a soakage pit under it. These soakage pits are constructed in the same way as a urinal soakage pit except that the urinal pipes are

omitted. A grease trap is provided for each pit, except those under showers. The area under field showers, as well as under drinking devices, should be excavated a few inches and then filled with small, smooth stones to keep the water from standing. If a soakage pit becomes, clogged, it is closed, and a new one is constructed. A soakage pit is closed by covering it with 1 foot of compacted earth.

(3) Soakage trenches. If the ground water level or a rock formation is close to the surface, soakage trenches instead of pits should be used. A soakage trench consists of a pit, 2 feet square and 1 foot deep, with a trench extending outward 6 or more feet from each of its sides. The trenches are 1 foot wide and vary in depth from a foot at the central pit to 1 1/2 feet at the outer ends. The pit and trenches are filled with the same material used in a soakage pit. Two such units should be built to dispose of liquid kitchen waste for every 200 persons, and each unit should be used on alternate days. One unit should be built for each washing device provided. A grease trap is provided for each soakage trench. A soakage trench is closed by covering it with 1 foot of compacted earth. Construction of a soakage pit is the same as for a urine soakage pit minus the pipes.

(4) Grease traps.

(a) Baffle grease trap.

1. A baffle grease trap may be made from a drum or from a watertight box. The drum or box is divided vertically into an entrance chamber and an exit chamber by attaching a wooden baffle. The baffle should be placed so that the entrance chamber will be approximately twice the size of the exit chamber. The baffle should hang to a point within 1 inch of the bottom. A strainer that may be made from a small perforated box filled with straw, hay, or burlap is inserted into the lid above the entrance chamber. A pipe is inserted into the exit chamber about 3 to 6 inches below the top as an outlet to the soakage pit. This baffle grease trap is usually placed on the ground at the side of the soakage pit with the outlet pipe extending 1 foot beneath the surface at the center of the pit. If a grease trap is not watertight, it must be placed partially under the ground.

2. Before the grease trap is used, the chambers are filled with cool water. The waste liquid is poured through the strainer that retains any solids. As the warm liquid strikes the cool water, the grease rises to the surface of the entrance chamber; and the liquid runs under the baffle, filling the exit chamber. When the liquid reaches the outlet pipe near the top of the exit chamber, it runs through this pipe into the soakage pit. Unless the grease trap is of sufficient capacity, the warm greasy liquid poured into the trap will heat the cool water in the trap, thus allowing the grease to remain uncongealed and to pass through the trap. The efficiency of this grease trap can be increased by constructing it with multiple baffles. Also, a series of traps may be used.

3. The baffle grease trap must be properly maintained to prevent clogging of the soakage pit. The grease retained in the trap should be skimmed from the surface of the water daily or as often as required and either buried of burned. The entire trap should be emptied and thoroughly scrubbed with hot, soapy water as often as necessary.

TWO-THIRDS

ONE-THIRD
5-6" FROM TOP

SOAKAGE PIT

BAFFLE GREASE TRAP

1" CLEARANCE
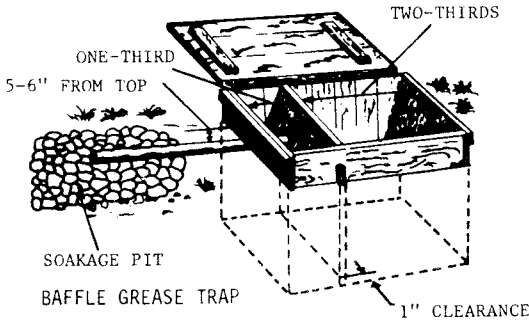
(b) Barrel filter grease trap.

1. The barrel filter grease trap may be made from a 30- to 50-gallon barrel or drum that has the top removed and a number of large holes bored into the bottom. Eight inches of gravel or small stones are placed in the bottom and covered with 12 to 18 inches of ashes or sand. A piece of burlap is fastened to the top of the barrel to serve as a coarse filter. The trap may be placed directly on the soakage pit, or it may be placed on a platform with a trough leading to the pit.

2. Every 2 days the grease trap should be emptied, washed, and refilled as described in 1 above. The material removed should be buried. The burlap filter should be either washed or replaced every day.



FILTER GREASE TRAP

LIQUID KITCHEN
WASTES

BURLAP

55-GAL DRUM WITH
TOP REMOVED AND
BOTTOM PERFORATED

SAND OR CHARCOAL

GRAVEL

SOAKAGE PIT
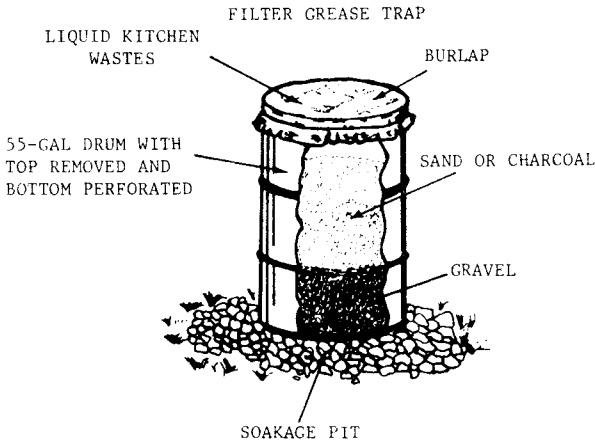
f. Garbage disposal. Garbage is the solid or semisolid waste resulting from the preparation, cooking, and serving of food. It does not include rubbish. Garbage is disposed of by burial or incineration.

(1) Burial. When troops are on the march, in bivouac, or in camps for less than a 1-week duration, garbage is disposed of by burial in pits or trenches. These pits or trenches should not be over 30 yards from

the mess area. Garbage must not, however, be buried closer than 100 feet from any source of water used for cooking or drinking.

(a) Pits are preferred for burying garbage during overnight halts. A pit 4 feet square and 4 feet deep is suitable for 1 day for a unit of 100 men. At the end of the day or such time as the pit is filled to 1 foot below the ground surface, it should be sprayed with insecticide; then it must be filled with earth and mounded over with an additional foot of compacted earth.

(b) The continuous trench is more adaptable to stays of 2 days or more. The trench is first dug about 2 feet wide, 3 to 4 feet deep, and long enough to accommodate the garbage for the first day. As in the pit method, the trench is filled to not more than 1 foot from the top. The trench is extended as required, and the excavated dirt is used to cover and mound the garbage already deposited. This procedure is repeated daily or as often as garbage is dumped. It is a very efficient field expedient for disposing of garbage.

(2) Incineration.

(a) In temporary camps of over 1 week, the garbage is often burned in open incinerators. Excellent types of open incinerators may be constructed from materials that are readily available in any camp area. Since incinerators will not handle wet garbage, it is necessary to separate the liquid from the solid portion. This is done by straining the garbage with a coarse strainer such as an old bucket, salvaged can, or 55-gallon drum in which holes have been punched in the bottom. The solids remaining in the strainer are incinerated, and the liquids are poured through a grease trap into a soakage pit or trench. Field incinerators should be located at least 50 yards downwind from the camp to prevent their being an odor nuisance.

(b) The inclined plane incinerator's effectiveness in combustion and the fact that it is somewhat protected from rain or wind make it an excellent improvised device. Time and skill, however, are required in building it. A sheet metal plane is inserted through telescoped 55-gallon drums from which the ends have been removed. The metal plane should extend approximately 2 feet beyond the upper end of the telescoped drums to serve as a loading or stoking platform. The telescoped drums are positioned on an inclined surface. A grate is placed at the lower end of the telescoped drums, and a wood or fuel oil fire is provided under the grate. After the incinerator becomes hot, drained garbage is placed on the stoking platform. As the garbage becomes dry, it is pushed through the telescoped drums in small amounts to burn. Final burning takes place on the grate. If time does not permit the construction of the inclined plane incinerator, it may be simplified as follows: Dig a fire pit at the bottom of an incline, line it with rocks, and place a grate over it. Place three telescoped drums in a shallow trench up the incline, letting the lower end of the telescoped drums extend somewhat over the fire pit so the flame will be drawn up the drums. The sheet metal plane, if available, should be used, as it permits more thorough drying of the garbage.
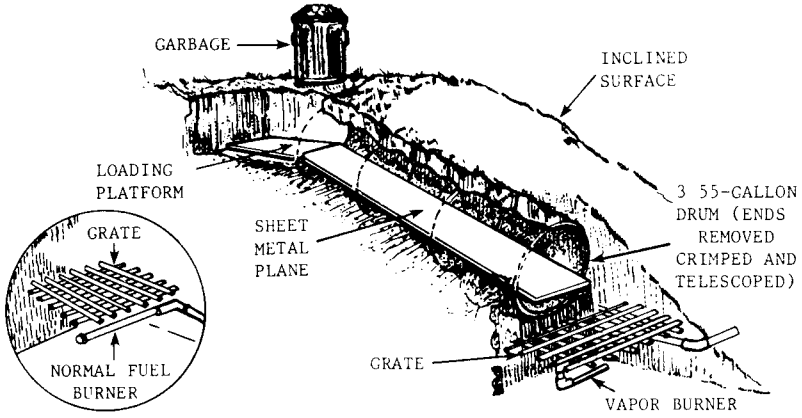
· INCLINED PLANE INCINERATOR.

(c)  A barrel incinerator (illustrated below) is made from a 55-gallon drum by cutting out both ends, punching many holes near the bottom, and inserting grates inside the barrel several inches above the holes.  The barrel is supported several inches above the ground on stones, bricks, or dirt filled cans, thus allowing space to build a fire under the barrel.  The rubbish is put into the barrel on the top grate.



BARREL INCINERATOR
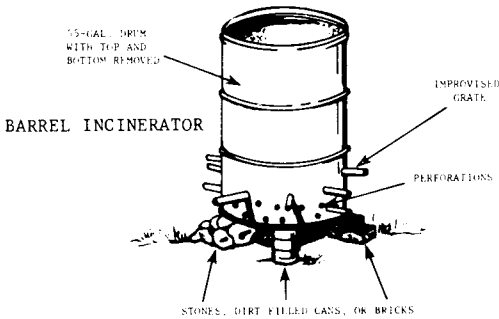
20-8.  WASHING DEVICES.

    a.  Hand washing devices (locate at latrine enclosures and unit messes).

        (1)  Suspended 5-gallon water can.  From a frame over a soakage pit suspend one can of clear water and one can of soapy water so they can be tilted.

        (2)  Mounted #10 can.  Make four holes in the bottom of can and mount it on a stand built over a soakage pit.  Have on hand a 5-gallon can of water with a dipper and a bar of soap.

    b.  Shower devices.  (Use soakage pits; a grease trap should be included if soap is used.)

        (1)  Solar heated shower.  Build a drum support to hold 500-600 lbs; color drum a dark, nonreflective shade.  Invert a 55-gallon drum on stand.  Attach a water control device to bung (top removed).  Below valve, attach a tin can with perforated bottom.



SOLAR HEATED SHOWER
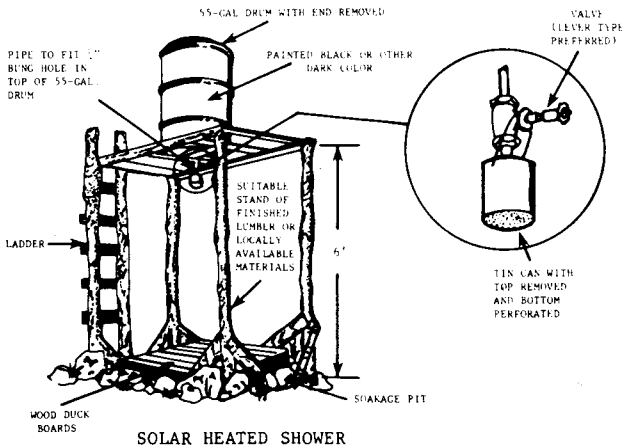
        (2)  Tilted drum shower.  Mount drum so it will tilt.   Attach rope to one end of drum and attach safety strap onto the frame at the opposite end.  Punch holes in side opposite top.  Place rod halfway thru drum and in notches.

        (3)  Shower utilizing oil-water flash burner.  (See diagram on next page.)  Mount two 55-gallon drums on an overhead platform.  Use pipe fittings to control water and flow.  Connect heating drum (15 gallon) to overhead drum by rubber hoses.  Place 15-gallon drum on an oil-flash burner.

SHOWER UTILIZING OIL-WATER FLASH BURNER
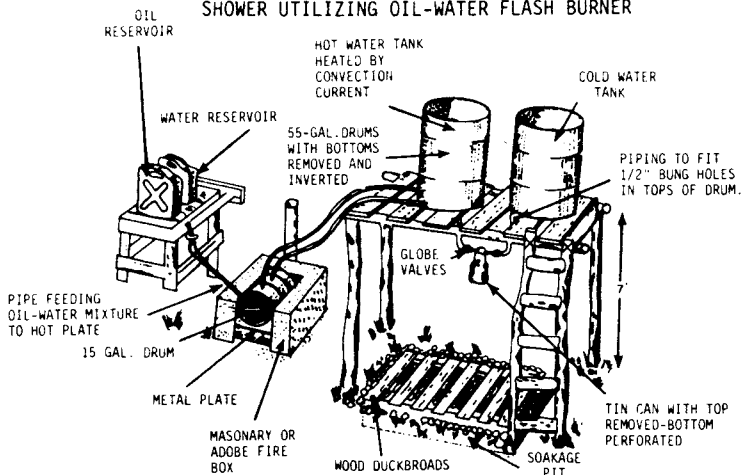


## 20-9. FOOD SANITATION.

a. Importance of food sanitation. Even the most appetizing food can cause illness if it becomes contaminated with pathogenic organisms through improper handling. Outbreaks of food poisoning, dysentery, infectious hepatitis, and typhoid fever may result from unsanitary practices in kitchens and dining areas. Therefore, persons who handle food must always maintain the highest standards of personal hygiene and sanitation.

b. Food handlers.

(1) All food handlers must be given a thorough physical examination. Those who have communicable diseases or who are known carriers of such diseases are not assigned as food handlers. Even more important than this initial screening is the supervisor's daily on-the-job check of food-handling personnel for signs of illness or infection. This inspection should be thorough enough to make certain that food handlers have no obvious signs of illness or infection; their hands, fingernails, and clothing must be clean, and they must have no boils, rashes, or other skin and wound infections. Food handlers should be instructed to report sore throats, colds, coughs, diarrhea, vomiting, and other symptoms of infection and disease. Questionable cases will be relieved from duties without delay. Food handlers should be provided adequate sanitary facilities, including showers, hand-washing devices, and latrines.

c. Transportation. Vehicles used for transporting food must be clean and completely enclosed.

d. Storage. Perishable food products are stocked at a realistic operating level. They should be refrigerated at 45oF. or below. Vegetables such as potatoes and onions are stored in a dry place on dunnage so air can circulate around them. Acid foods such as citrus fruit drinks must never be stored or served in galvanized iron cans.

e. Cleaning of cooking, serving, and eating utensils. The two procedures that may be used by kitchen personnel in cleaning the cooking,

serving, and eating utensils are outlined below:

(1) Procedure to be used when hot water is available. Scrape utensils free of food particles. Wash utensils in warm water containing soap or detergent. Rinse utensils in hot clear water. Disinfect utensils by immersing them in clear water of 180oF. for 30 seconds. If a thermometer is not available to determine the temperature of the water, heat the water to the boiling point. Allow the utensils to air-dry in a place where they are protected against dust, splash, and other sources of contamination.

(2) Procedure to be used when hot water is not available. Scrape utensils free of food particles. Wash utensils in water containing soap or detergent. Rinse utensils with potable water. Disinfect utensils by immersing them in a chlorine-water solution for not less than 30 seconds. This solution is prepared by using Disinfectant, Food Service, as specified on its container. If this disinfectant is not available, an emergency solution can be prepared by mixing at least one level messkit spoonful of calcium hypochlorite (water disinfecting powder) to each 10 gallons of water. If liquid chlorine bleach is available, it may be used. About one-third canteen cup of 5 percent chlorine bleach to each 10 gallons of water will provide the same disinfecting strength. Fresh chlorine-water solutions must be made for rinsing and disinfecting utensils for each 100 persons. Allow the utensils to air-dry in a place where they are protected against dust, splash, and other sources of contamination.

(3) Method of heating water.

(a) Oil-water flash burner.

1. The oil-water flash burner uses diesel or motor oil as fuel. In cold climates it may be necessary to thin these oils with gasoline or kerosene to obtain a good flow. If waste motor oil is to be used as fuel, it must first be strained through a screen or a cloth to remove sludge and lumps.

2. One oil-water flash burner is required for each large can of water to be heated. This burner consists of containers for the oil and the water, a feed pipe, a metal burner plate, shields, and a grate. The containers are equipped with valves, taps, plugs, or siphons for controlling the rate of fuel and water flow. The shields, which prevent strong drafts or rain from cooling the plate, may be made from sheet metal or oil drums.

3. Serious explosion may result from an improperly constructed or operated burner. If the flame of a burner goes out and the fuel is not burned off, turned off, or relighted immediately, a dangerous concentration of gas may build up. If this gas is ignited, an explosion may result. This danger is not as great with the oil-water flash burner as it is with the vapor burner. The automatic relighting device will lessen the possibility of such an explosion. Also the possibility of an explosion in a fuel tank can be considerably decreased by not allowing the fuel to fall below the half-full mark. A visible float-level indicator should be used.

(b) Vapor burner.

1. The vapor burner uses liquids such as diesel oil,

kerosene, or gasoline, or a combination of these. As with the oil-water flash burner, it may be necessary in cold climates to thin the oil with gasoline before use. The construction of this burner requires several sections of pipe, a valve, pipe fittings, and a fuel reservoir. The operation of the vapor burner depends upon vaporization of the fuel by preheating before burning.

2. The pipe is assembled in such a manner that it is doubled under itself. The best size pipe to use is either one-half or three-quarters of an inch in diameter. Very small holes (1/16-inch or less) are drilled in the top of the lower pipe at points where the water containers will be placed. The end of the pipe is capped so that fuel can escape only from the drilled holes. Burning fuel that escapes from the holes in the lower pipe heats the fuel in the upper pipe, causing the fuel to vaporize into gas. The gas produces pressure in the lower pipe and forces the fuel out through the small holes as spray, thus making a better flame. For best operation, the pipes should be placed in a fire trench. The trench should be about 1 foot wide and 15 inches deep. Iron wire should be coiled around lower pipe just above the holes to serve as an automatic relighting device. These wires become red hot after the burner has been in operation for a few minutes. Should one flame go out, the heat from the wires would relight the fuel, thus preventing an accumulation of gas in the trench and a possible explosion.

3. Before lighting the burner, the valve that controls the flow of fuel is opened to allow a small amount of fuel to run out through the holes in the lower pipe. This fuel is then ignited, thus heating the upper pipe and starting the fuel-heat-gas pressure cycle described above. A properly operated burner will produce a blue flame. A yellow flame, which indicates incomplete burning, is caused by too much fuel escaping from the holes. This may be corrected by closing the valve slightly, thus reducing the amount of fuel going to the burner, or by decreasing the size of the holes in the pipe. If the flame is blue, but tends to blow itself out, not enough fuel is getting through the holes. The condition may be corrected by opening the valve slightly, thus allowing more fuel to go to the burner, or by enlarging the holes in the pipe.

(6) Fire trench.

1. When solid fuels are available, a fire trench is one method used for heating. The trench should be about 1 foot wide and 1 foot deep. Its length will depend on the number of water cans to be heated. An 8-foot trench is usually sufficient for three cans. The cans, supported by steel rods or pipes, are placed over the trench; and the fire is built in the trench. Oil drums cut into halves and with the ends removed may be placed around the water containers to increase heating efficiency.

2. Except as a temporary measure, the fire trench is not considered a practical method for heating water. It requires a large amount of solid fuel, such as coal or wood, that ordinarily is not plentiful in the field. Unless windshields are used around the corrugated cans, heating water to the boiling point becomes very difficult. Furthermore, the external heat from the open flame quickly burns out the cans. It also makes standing close enough to wash mess kits uncomfortable and possibly hazardous.

(4) Drums. When corrugated cans are not available, messkit

washing containers may be made from metal drums and used with any of the
heating devices. The drums may be used with or without modification in
size. In the modification of drums, they should be cut into two-thirds and
one-third portions. The two-thirds portions are used as washing
containers; the one-third portions are used as needed for supports or
shields. Although drums are ordinarily cut crosswise, they may be cut
lengthwise. The two-thirds portions of drums cut lengthwise are placed
directly on a trench.

      (5) Drainage device.

        (a) As an aid in draining washing containers, a pipe
coupling can be welded into the bottom of each of the three containers;
then all three containers can be connected with pipes to one central outlet
pipe. This central outlet pipe should be positioned so that the water will
pass through a grease trap into a soakage pit.

        (b) Plugs or pipes may be screwed into the pipe couplings
inside the washing containers to secure the water until drainage is
desired. If a pipe is used, it must be cut long enough to extend above the
water level.
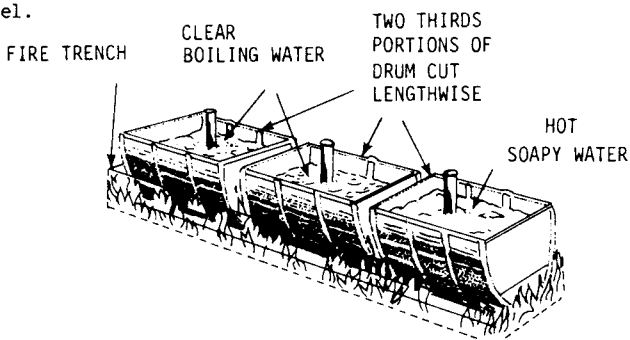


FIRE TRENCH AND DRUMS FOR MESSKIT WASHING SETUP

20-10. ARTHROPOD AND RODENT CONTROL.

    a. Rodent control. The key to rodent control is good area police.
There are many sophisticated programs that can be instituted; but if
insects and rodents are denied a place to live and breed through a good
clean-up campaign, a good start has been made in eliminating the problem.
Ditches and depressions should be kept free of standing water. Do not
allow garbage to remain unburied since it will attract flies and rats.
Rats should be live-trapped and burned to kill fleas and mites they may
have in their fur.

    b. Arthropod control. An effective program for the prevention of
arthropod-borne diseases should consist primarily of sanitation measures,
but includes the use of personal protective measures and the application of
pesticides. Fundamental to the operation of an effective program are a
basic understanding of the life cycles of medically important arthropods
and a knowledge of where they can be found. The following chart will serve
as a reference.

| MEDICALLY IMPORTANT ARTHROPODS | APPROXIMATE DURATION OF LIFE CYCLES AT 75oF. | WHERE FOUND |
|---|---|---|
| Flies (Example: housefly) | Egg---------10 hours<br>larva------- 5 days<br>pupa--------- 5 days<br>adult-------30 days | Animals or human waste, garbage, grass, decomposing animals, and mud contaminated with organic material. |
| Mosquitoes (Example: yellow fever mosquito) | Egg--------- 4 days<br>larva-------10 days<br>pupa--------- 2 days<br>adult-------14 days | Standing water found in ponds, tin cans, old tires, and tree holes. (A large variety of places and conditions of breeding have been noted.) |
| Fleas (Example: oriental rat flea) | Egg--------- 7 days<br>larva-------15 days<br>pupa--------- 8 days<br>adult------365 days | Nests or beds of animals. |
| Lice (Example: human body louse) | Egg--------- 7 days<br>nymph-------16 days<br>adult-------30 days | Head hair and clothing of humans. Lice cannot exist on a clean human. |
| Cockroaches (Example: German cockroach) | Egg---------30 days<br>nymph-------60 days<br>adult------200 days | Cracks and crevices that provide warmth, moisture, and food such as around water, garbage, and food facilities. |
| Ticks and mites | Life cycle   6 weeks<br>completed        to<br>                  2 years | Tall grass, underbrush, animal watering places, and shady rest areas of animals. |

20-11.   IMMUNIZATION REQUIREMENTS (MILITARY ALERT FORCES).

| IMMUNIZATION | NO. OF SHOTS | BASIC SERIES DOSAGE | INTERVAL | REIMMUNIZATION INTERVAL | DOSAGE |
|---|---|---|---|---|---|
| Smallpox (*1) | 2/4 punctures | 1 gtt . | | 3 yr | |
| Dipt/Tetanus | 3 | 1st) 0.5 cc.<br>2d) 0.5 cc.<br>3d) 0.1 cc. | 4-8 wk<br>12 mo | 10 yr (*2) | 0.1 cc. |
| Typhoid | 2 | 1st) 0.5 cc.<br>2d) 0.5 cc. | 4 wk | 3 yr | 0.5 cc. |
| Cholera | 2 | 1st) 0.5 cc.<br>2d) 1.0 cc. | 1 wk | (*3) | |
| Plague | 2 | 1st) 1.0 cc.<br>2d) 0.2 cc. | 3 mos | (*4) | |
| Yellow Fever | 1 | 0.5 cc.<br>Dilute 1:10 | NA | 10 yr | 0.5 cc. |
| Polio | 3 | 1st) 2 gtt.<br>(*5)<br>2d) 2 gtt.<br>(*5)<br>3d) 2 gtt.<br>(*5) | 6-8 wk<br>12 mos | S/C | NA |
| Influenza | 1 | 0.5 cc. (*6) | NA | 1 yr | |

General:  All inoculations may be given either IM or SQ, with the exception
of plague that must be given IM and smallpox that is given by the technique
described below.

*1 Smallpox        Reaction should be read 6-8 days after administration.
                   Primary vaccination:  Typical vesicle formation.
                   Revaccination:  Major - vesicular or pustular lesion or
                   an area of induration or congestion surrounding a
                   central crusted or ulcerous lesion.  Minor - any other
                   reaction.  If minor, check procedures and revaccinate
                   one time only.  Punctures are given intradermally, 4
                   times with single needle or 2 times bifurcated needle
                   initially and 30 times single needle or 15 times
                   bifurcated needle for the revaccination.

                   NOTE:  Do not clean the skin unless grossly dirty, then
                   only with acetone.  Never use alcohol to clean skin and
                   allow the skin to dry before giving the vaccination.

*2  Dipth/Tetanus: If the basic series has been completed within the last
                   5 years, no booster is required for minor injuries.
                   If there is doubt, or the injury is severe or a burn, a
                   booster should be given and the dosage increased from
                   0.1 cc. to 0.5 cc.  When in doubt whether tetanus
                   diphtheria should be given, administer only tetanus
                   toxoid.

*3  Cholera:      Reimmunization is required only upon deployment to Area
                  II as outlined in AR 40-562 and while residing in Area
                  II or as recommended by the World Health Organization
                  (WHO). Revaccination is required every 6 months
                  at 0.5 cc. dosage, SQ or IM.

*4  Plague:       Reimmunization is required only upon deployment to Area
                  IIP as outlined in AR 40-562 and while residing in Area
                  IIP or as recommended by the World Health Organization
                  (WHO). Revaccination is required every 6 months
                  at 0.2 cc. dosage, IM only.

*5  Polio:        The number of drops comprising the proper dose depends
                  on the manufacturer's recommendations and will be given
                  orally.

*6  Influenza:    Dosage may be varied with the recommendations and
                  guidance of the manufacturer or medical authority.
                  Worldwide geographic variations in seasonal influenza
                  outbreaks increase potential morbidity rates in alert
                  forces by flu. The requirement for mandatory
                  vaccination of Army personnel will be further augmented
                  by the mandatory requirement that all personnel in
                  CMA/IMA will receive the flu vaccine regardless of
                  program requirements in order that maximum protection
                  may be afforded against influenza in the worldwide
                  environment.

                  Maximum effort will be given to immunize personnel
                  during the October-November time period; however, the
                  program will not be curtailed at the end of that
                  period.

NOTE: Live viruses: There should be a 30-day separation period
when giving more than one live virus for the best immunity reaction. If
necessary, two live viruses may be given on the same day, but at different
sites. Once a live virus has been administered, no other live virus will
be administered until the 30-day separation period has elapsed. The
receiving individual should be afebrile and in good health. He must not
be receiving any of the following: steroids, alkylating drugs,
anti-metabolites, immunosuppressive agents, or radiation therapy. Pregnant
women will not receive any live viruses except polio.

20-12.  TECHNIQUE OF SOAP MAKING.

        a.  Ingredients.

            (1)  Method one: Two #10 cans of animal fat, two #10 cans of
water, and one #10 can of lye.

            (2)  Method two: Two #10 cans of animal fat and two #10 cans of
water poured through ashes.

            (3)  Optional ingredients: One-half cup borax, one-half cup
liquid washing ammonia, and two tablespoons of granulated sugar.

        b.  Technique.

(1) Cut the fat into small strips and place into a pot to melt – moderate heat.

(2) Slowly add the lye and water (or the water that has been poured through the ashes) to the melted fat and stir until the mixture is about the consistency of honey. The optional items may be added during this procedure.

(3) Pour the thickened mix into a container to cool. After standing a few hours, the soap may then be cut into the desired sizes.

(4) This type of soap is excellent for both laundry and hands.

CHAPTER 21

VETERINARY MEDICINE


21-1.  FOOD PROCUREMENT, INSPECTION, AND PREPARATION.

        a.  Dangers from food sources.

            (1)  Physical - contamination of food by arthropods, metal
fragments, glass, radioactive particles, etc.

            (2)  Chemical - contamination of food with chemical agents,
industrial chemicals, and other adulterating chemicals (zinc,
copper, cadmium, pesticides, etc.).

            (3)  Biological - contamination of food by pathogenic
microorganisms (bacteria, fungi, virus) or unacceptable levels of spoilage
microorganisms.

        b.  Semiperishable rations (canned and dried food products).
Freezing and extreme heat can change semiperishables both chemically and
physically; therefore, protect rations from environmental extremes.  It is
necessary to periodically monitor rations for condition of product and
packaging as well as for arthropod infestations.  Discard moldy grain
products (ergotism).  Cans with swelling and/or leaking cans should not be
used.  Rust on cans and dented cans can be used as long as product in can
is unaffected.

        c.  Perishables.

            (1)  Fresh fruits and vegetables should be procured from an
inspected source; however, cooking (to 116°F.), immersing in boiling water
30 min, or 100 ppm. chlorine disinfectant solution (1 1/2 oz. of 5% bleach
in 5 gallon $H_2O$) will destroy most pathogenic organisms.

                (a)  If possible, avoid night soil grown vegetables.
Always wash, peel, and disinfect (or cook) if in doubt.

                (b)  Acid foods should not be stored or served in
galvanized containers (zinc toxicosis).

                (c)  Edibility and nutrition of unfamiliar plants are best
determined by observing their use by the native people and animals (always
cook).

            (2)  Eggs and dairy products.

                (a)  Eggs should always be cooked (salmonellosis).  Blood
and meat spots are acceptable in eggs (not rotten or cracked).

                (b)  Unpasteurized dairy products must be pasteurized or
boiled for at least 15 seconds (TB, Q fever, brucellosis, and other).

            (3)  Shellfish and fish.

                (a)  Cooking is essential for all seafood (hepatitis,

bacteria), and freshwater fish (tapeworm, fluke, other).

(b) Some shellfish toxins (i.e., during red tides) are heat stable; therefore, it is best to avoid all shellfish.

(c) Some saltwater fish have heat stable toxins. Judge what is toxic by what the native population eats.

(d) Seafood spoils quickly; therefore, avoid if there are off-odors, sticky or pitting flesh, sunken eyes, or scales that come off easily. Remember, local ice can contaminate the product.

(4) Meat and meat products.

(a) If cooked well (to avoid trichinosis, tapeworms, other), fresh meat from healthy animals is safe to eat. Carcass meat offers less chance of potential contamination than visceral meat and therefore is preferred as a food source.

(b) Antemortem exam. Briefly follow outline as given under Animal Health section - animal exam in paragraph 21-3b. Be attentive especially to:

1. Posture and gait; reject deformed or "down" animals.

2. State of nutrition; reject if very poor (chronic disease).

3. Reaction to environment; reject if very lethargic (ill) or hyperexcitable (rabies, tetanus).

4. Appetite, rumination, feces; reject if disease is indicated.

5. Respiratory system; reject if breathing is labored or coughing is severe.

6. Vulva, mammary gland; reject if signs of infection are noted.

7. Hide, skin, hair; reject if there are diffuse lesions.

8. Temperature; reject if elevated (may recheck later).

NORMAL PHYSIOLOGIC VALUES

| | Rectal T. (F.) | Heart rate | R. rate | Daily feces lbs | Daily urine ml./kg. | W.B.C. x103 | HCT% |
|---|---|---|---|---|---|---|---|
| Horse | 100.5 | 23-70 | 12 | 30-50 | 3-18 | 6-12 | 39-52 |
| Cow | 100.5 | 60-70 | 30 | 30-100 | 17-45 | 4-12 | 24-48 |
| Sheep | 103 | 60-120 | 19 | 2-6.5 | 10-14 | 4-12 | 24-50 |
| Goat | 104 | 70-135 | | | 10-14 | 6-16 | 24-48 |
| Pig | 102 | 58-86 | | 1-6.5 | 5-30 | 11-22 | 32-50 |
| Dog | 101.5 | 100-130 | 22 | 0-1.5 | 20-100 | 6-18 | 37-55 |
| Cat | 101.5 | 110-140 | 26 | | 10-20 | 8-25 | 24-45 |
| Rabbit | 102.5 | 123-304 | | | | | |

(c)  Humane slaughter, field methods, and dressing.
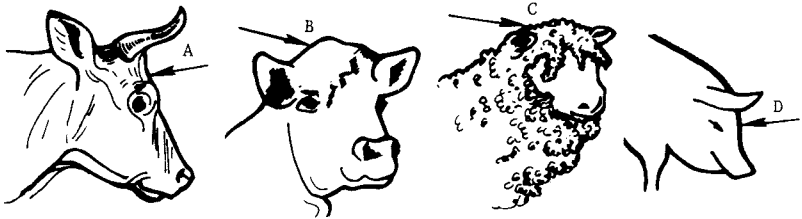


FIRING POSITION WITH HUMANE KILL.

A - Cattle          B - Calves

C - Sheep           D - Pigs

1.  Bleed promptly; cut throat at point A.  If head is to be mounted for trophy, insert knife at point B, cutting deeply until blood flows freely.  In case of wound that bleeds freely or internally, bleeding may not be necessary.  But it is far better to follow the sticking "ritual."



2.  Remove genitals or udder.  Prop carcass belly up; rocks or brush may be used for support.  Cut circular area shown in illustration.  Musk glands at points A and B may be removed to avoid tainting meat.  Glands cease to function at time of death.



21-3
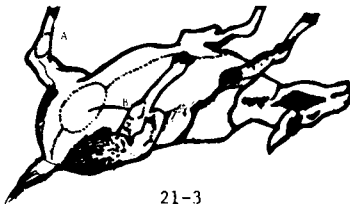
3. Split hide from tail to throat. Insert knife under skin, but do not cut into body cavity. Hide may be peeled back several inches on each side to keep hair out of meat. Cut through pelvic bone. Turning carcass downhill will cause viscera to sag into rib cavity. This will decrease chance of puncturing viscera while cutting through bone. Large intestine can then be cut free from pelvic cavity but not severed from viscera.



4. Open carcass by cutting through length of breastbone and neck into exposed windpipe. Turn carcass head uphill. Free gullet and pull viscera toward rear. An alternate method is to leave head downhill and strip viscera from rear out over the head.
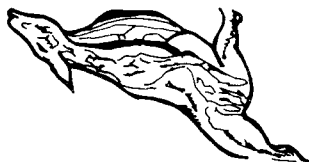


(c) Postmortem exam. Should be done immediately after slaughter. Be attentive for:

1. State of nutrition; reject emaciated animals.

2. Bruising; cut off bruised area if local.

3. Swelling in joints, muscle, bones; cut out if local, reject if found in more than one body area.

4. Edema; sign of disease, reject unless localized.

5. Inflammation, adhesion, or abcessed pleura, peritoneum, or viscera; sign of septicemia--reject carcass.

6. Cut through tongue, cheek, diaphram, lung, liver, and several lymph nodes (thoracic and mesenteric lymph nodes most important) to check for parasitism and/or signs of other infections.

Caseated areas (cheeselike hardened abcesses) call for rejection (possible TB).

      (5) Poultry.

         (a) Antemortem. Check as in red meat with emphasis on alertness of bird, signs of respiratory problems, and level of nutrition.

         (b) Slaughter by ringing neck, dislocation of neck, or beheading.

         (c) Postmortem. Check eyes, gonads, and visceral organs for tumors or skin lesions. Emaciated birds may indicate TB and therefore should be rejected. Generalized inflammation or abcesses (septicemia) also warrant rejection. Also reject jaundiced birds, birds with severe arthritis, ascites, or maggots (not lice).

         (d) Poultry is a potential source of salmonellosis; therefore, use fresh, refrigerate, or freeze.

21-2. STORAGE AND PRESERVATION. Storage and preservation are best accomplished by cold. Other methods include smoking, curing, making jerky and pemmican, salting and pickling, canning and using sugar solutions, and antibiotic treatment.

    a. Smoking. The process of smoking meat as a means of preservation and as a taste enhancer is extremely old. Although it has largely been replaced by more modern, faster methods of food preservation, it is still a viable procedure for the SF medic in a field environment during UW operations. There are several acceptable methods, and the one outlined below should not be considered as the only safe method. There are also variations in the step-by-step instructions, depending on the type of meat. Regardless of the type of meat, there are several basics for smoking meat that do not change.

         (1) No matter what type of meat is smoked, a smokehouse will be needed. This can be any type of building that has a roof vent (or have one installed), that is otherwise fairly well sealed, and that has a floor that will take a firepit. The firepit (or box) should be centered in the floor and be about 2 feet deep and 2 feet wide, depending on the amount to be cured at one time and the size of the smokehouse.

         (2) The wood used for the fire should be from deciduous trees (shed leaves in winter) and preferably green. Do not use conifers (needle leaf), such as pine, firs, spruces, cedars, as the smoke these woods produce gives the meat a disagreeable taste. Start the fire and let it burn down to coals only, and then stoke it with green wood. The fire should be a "cold smoke" fire (less than 85°F.) that has only coals, not flames, during the smoking process. The meat should then be placed in the smokehouse and hung from the rafters.

         (3) The rafters should be wooden poles of green wood to prevent burning and should run the length of the smokehouse. Suspension line or string may be used to connect the meat to the rafters. When hung, the bottom of the meat should be at least 4 feet but no more than 5 feet from the top of the firepit. All meat should hang free (not touching any other meat or the walls of the smokehouse) so it will smoke evenly and prevent spoilage from contact. Usually meat is smoked a minimum of 4-5 days,

depending on the size of the smokehouse and the number and size of pieces of meat being smoked. After the meat is smoked, it should be stored in the smokehouse if feasible.

(4) Preparing meat for smoking varies with the type of meat.

(a) Beef.

1. Remove the large bones, especially the joints, to prevent souring during the smoking process.

2. Trim the fat from the outer surfaces of the meat. The fat should be kept for making pemmican and candles.

3. Section the meat into manageable pieces, always cutting across the grain, not with the grain. This makes for more tender meat and helps speed up the smoking process.

4. Cut a hole in the meat and string it with heavy twine, suspension line, etc. The hole should be placed so as to prevent the string ripping through the meat during the smoking process.

5. Hang the meat in the smokehouse and fill out a smoking record. The record will enable you to follow the same procedure the next time you smoke meat.

(b) Pork.

1. Pork smoking is much like the beef process. Hot water can be used to help remove the hair from the skin of the animal.

2. Do not remove the layered fat or the bones except ball and socket joint bones. Do not scrape off the rendered fat (fat oozing from the pork during smoking).

3. Follow steps 3, 4, and 5 above.

(c) Smoked meat will generally stay in good shape for up to 1 year, depending on how well the instructions are followed, the climate, insect and rodent control, the condition of the meat prior to smoking, and other factors. If the meat should appear sour around a bone area, section the meat to expose the sour area for 24 hours. If the sour appearance clears up, the meat is generally safe. If it does not clear up, dispose of the meat. If moisture patches or small holes appear on the surface of the meat, it is going sour. If the area can be cut out and the remainder appears to be good, it can be kept. If the holes or moisture is throughout, it is ruined and must be disposed of--if in doubt, throw it out.

b. Curing. One way to keep meat fresh in conjunction with smoking is by curing it. This process works well by itself, but is best used with smoking. Various spices, sugar, salt, and brines may be used, but the method described below is a dry salt (coarse, not table) treatment. Like smoking, curing is a simple process.

(1) A work/storage area protected from insects and rodents is important in this method. The initial step is the same as step 1 in the beef smoking process. After this step has been completed, rub salt into

the meat to prepare it for the salt box (a wooden container large enough to hold the sectioned salt-covered meat). Cover the bottom of the salt box with salt. Place the salted meat in the salt box. If more than one piece of meat is placed in the box, be sure that the pieces do not touch each other. Cover the meat with salt. This procedure should be repeated in 2 days and repeated again 2 days later. The salt should be changed for each repetition. On the sixth day, remove the meat from the salt box. Place a layer of green pine straw, hay, etc., on the ground or floor (again in an area protected from rodents and insects), cover the hay with salt, and place the meat on the layer of salt. Cover the meat with salt and place a layer of straw on the salt-covered meat.

(2) The meat may be left in this manner until used or up to 1 year, depending on the same factors as for smoked meat. It should be inspected regularly.

(3) It is generally recommended that the meat be smoked. If smoking and curing are to be done, curing should be done first.

(4) When the meat is to be used (if cured), it should be washed thoroughly and inspected. Again, if in doubt as to quality, throw it out. If the meat is still very salty, soak it in water for 2-3 hours, changing the water every 30 minutes.

(5) If possible, salt should be stored in a tightly sealed container. Do not reuse the salt. If sugar or other spices are to be used as well as salt, they should be added during the "rubbing" stage while curing. If a brine is to be used, it should not be used in a wooden or metal container. For adequate preservation, the brine should be a 10% salt solution (1 lb of salt to 9 pints of water) or stronger.

c. Meat preservation records. Records should contain the following information:

(1) Type of meat prepared.

(2) Source and date the meat was obtained.

(3) Weight and cut of meat.

(4) Time cured, time smoked, as applicable.

(5) Type and amount of wood used (for smoking).

(6) Approximate temperature of smoke.

(7) Type and amount of salt (for curing).

(8) Type and amount of seasoning, if any (for curing).

(9) Color and texture of meat when completed.

(10) Overall assessment.

d. Jerky. For field-prepared food that is light and nutritious, jerky fits the bill. Red meat (beef, venison, etc.) should be used.

(1) To prepare jerky--

21-7

(a)  Trim the fat from the meat.

(b)  Cut the meat with the grain of the muscle into 12-inch-long strips no more than 1 inch thick and 1/2 inch wide.

(c)  Pack the meat in dry salt for 10-12 hours with each strip completely covered with salt and no contact between strips.

(d)  Smoke the meat.

(2)  The meat may also be sun dried (sprinkle liberally with pepper to cut down on insects and store above the insect line, 20 feet or higher) or dried over slow coals, as with smoking, also sprinkled liberally with pepper.

(3)  If salt cured, wash thoroughly before eating.

e.  Pemmican.  Pemmican is also light and nutritious and can be made in the field.  The two basic ingredients needed are lean meat--sun, wind, or smoke-dried (not salt-cured)--and rendered fat.

(1)  Render fat by placing ground-up (preferred) or cut-up fat into a container.  Boil the fat and pour off the tallow to use in pemmican. (Tallow can also be used to make candles.)  The fat residue, called cracklings, can be eaten.  One ounce of beef cracklings provides 207 calories; one ounce of pork cracklings, 219 calories.

(2)  You need about 6 pounds of meat to make about 1 pound of pemmican.

(a)  Dry, pound, and shred the meat.

(b)  Prepare a casing, such as an intestine, by cleaning and tying one end.

(c)  Lightly place (do not pack) the shredded meat in the casing.

(d)  Pour hot tallow into the casing, heating the meat and filling the bag.  The mixture in the casing should be about 60% fat (tallow) and 40% meat.

(e)  Seal (sew or tie) the casing, then seal further by pouring tallow on the sealing.

(f)  Allow the pemmican to harden.

(3)  Pemmican will stay safe for consumption for approximately 5 years, depending on the type of tallow used.

f.  Salting and pickling.  Dry salt meat or immerse in a salt solution.  Use 10:1 table salt and saltpeter (potassium nitrate) for both. With pickling, mix 50 pounds of salt and 5 pounds of saltpeter with 20 gallons of water.

g.  Canning.  Heat is used to destroy harmful microorganisms but this is not as good as above since thermophilic bacteria may remain stable. Canning is better with fresh fruit and vegetables.

h. Sugar solutions and antibiotic treatment of meat is suggested for preservation, but again this process is not as effective as those listed above.

21-3. ANIMAL HEALTH.

    a. The association of men and animals may be viewed as threefold: Animals are often intimately associated with man's livelihood, such as work or food animals; they often have religious significance or are companions; and they have diseases that can be transmitted to man. With reference to animal health, consider the following:

        (1) Animal care may reduce zoonotic reservoiring of human disease, increase food production capabilities, and in general increase the standard of living of the people concerned.

        (2) Treating animals or advising on animal husbandry gains rapport and shows a caring attitude.

        (3) Veterinary care with immediate observable results is best for short-term operations.

        (4) Programs with distant goals must be approached with an appreciation for what is acceptable to the local population.

    b. Animal examination: Approach the exam as you would with humans except use adequate caution and restraint.

        (1) Allow owner and/or native population to handle and restrain the animal as much as possible. Restraint is probably the most difficult part of treating large animals. Following are a few simple methods of restraint that may be helpful. A rappelling rope may be used.

            (a) Temporary rope halter (horse or cow). Fasten a rope loop around the animal's neck with a bowline knot. Pull a bight of the standing part of the rope through the loop from rear to front and place it over the animal's nose. Pull tight when in use.



            (b) Twitch (horse). A twitch is a small loop of rope or smooth chain twisted tightly around the upper lip of the horse to divert its attention while less painful work is being done on some other part of the body. A metal ring or rod or a stick may be used as a handle to wind-tighten the rope loop on the animal's nose.

(c)  Burley method of casting (cow).  Use approx 40 ft
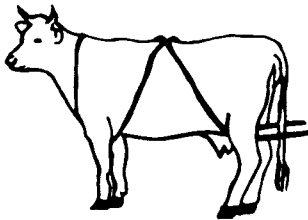


of rope with the center of the rope over withers.  Place the rest of rope as pictured above.  While the cow is being held by a strong halter at the head, pull the ends of the rope and the cow will fall.  To tie the rear legs, keep both ropes taut and slide the uppermost one along the undersurface of the rear leg to the fetlock.  Flex the leg and make a half hitch around the fetlock.  Then carry end around the leg and above the hock, across the cannon bone and back around the fetlock.  Tie the leg with several such figure "8s."



TYING THE COW AFTER CASTING.

Tying all four feet together is a good method of restraining after the animal has been cast.  A rope is tied to one leg below the fetlock.  The other legs are tied to this one alternately, first a front leg, then a rear one, etc.

(d)  Strap hobble (horse).  A strap with a "D" ring may be used to raise one foreleg.  The leg is bent at the knee and the pastern is brought towards the upper arm.  The strap is placed around the arm and pastern, and the end of the strap is brought through the "D" ring, pulled tight, and secured with a half hitch.

(e)  Tail restraint (cow).  The tail of a cow may be bent up sharply at the base, by an assistant, when it becomes necessary to distract its attention from another part of the body.  Keep both hands at the base of the tail (grasping it like a baseball bat) to avoid breaking the tail. Stand to the side to avoid being kicked.

(2)  SOAP approach to animal exam.

S.  Subjective - use HAAA SEMAN LHL.

1.  H - history - individual and herd.

2.  AAA - activity, attitude, appetite.

3.  S - skin - lesions, color, texture, state of hydration.

4.  E - eye, ear, nose, and throat - look in the mouth if possible.

5.  M - musculoskeletal system - palpate legs; watch the animal move.

6.  A - abdomen - palpate, auscultate.

7.  N - neurologic exam - coordination, cranial nerves, segmental reflexes.

8.  L - lungs - auscultate, rate, dyspnea.

9.  H - heart - auscultate, rate.

10.  L - lymph nodes - palpate submandibular, cervical and prescapular, inguinal and popliteals.

O.  Objective - use VUFL.

1.  V - vital signs - see normal values (Antemortem Exam).

2.  U - urinalysis - odor, color, pH, sp.gr., bacteria, etc.

3.  F - fecal exam - blood, excessive mucous, diarrhea, parasites, etc.

4.  L - other lab data - blood count, serology, etc.

A.  Assessment - use DAMN - IT.

1.  D - degenerative disease.

2.  A - anomaly/allergic disorder.

3.  M - metabolic disorder.

4.  N - nutritional/neoplastic disorder.

21-11

          5.  I - infection/infestation.

          6.  T - traumatic/toxicosis.

    P.  Plan - use TAEP.

          1.  T - treat, if feasible (with allergies, malnutrition, infections, infestations, and trauma/toxins).

          2.  A - advise (nutrition, culling of carriers, animal husbandry practice).

          3.  E - education (on herd health, preventive medical actions that the owner or community can take themselves).

          4.  P - public health (zoonosis potential in animals, human nutrition from animal protein source).

    c.  Remember that the types of diseases of animals fit the same categories as those of humans; therefore, without detailed instruction in veterinary medicine, one can only make a diagnosis on his level of knowledge.  Seek advice if needed and use the Merck Veterinary Manual if one is available on specific diseases.

CHAPTER 22

PRIMITIVE MEDICINE

22-1.  GENERAL.

a.  This chapter covers a number of primitive treatments using
materials that are found worldwide.  It does not cover herbal medicines
because specific herbs (plants) are difficult to identify and some are
found only in specific areas of the world.  This does not mean, however,
that they should not be used.  To get information concerning types and uses
of herbal medicines in a particular area, talk to the natives.  But
remember, it is preventive medicine (PM) that must be stressed.  Proper
hygiene, care in preparation of food and drink, waste disposal, insect and
rodent control, and a good immunization program can greatly reduce the
causes and number of diseases.

b.  All of us--patients and doctors alike--depend upon wonder drugs,
fine laboratories, and modern equipment.  We have lost sight of the
"country doctor" type of medicine--determination, common sense, and a few
primitive treatments that can be lifesaving.  Many areas of the world still
depend on the practices of the local witch doctor or healer.  And many
herbs (plants) and treatments that they use are as effective as the most
modern medications available.  Herbal medicine has been practiced worldwide
since before recorded history, and many modern medications come from
refined herbs.  For example, pectin can be obtained from the rinds (white
stringy part) of citrus fruits and from apple pomace (the pulp left after
the juice has been pressed out).  If either is mixed with ground chalk, the
result will be a primitive form of Kaopectate.

c.  Although many herbal medicines and exotic treatments are
effective, use them with extreme caution and only when faced with limited
or nonexistent medical supplies.  Some are dangerous and, instead of
treating the disease or injury, may cause further damage or even death.

22-2.  PRIMITIVE TREATMENTS.

a.  Diarrhea is a common, debilitating ailment that can be caused by
almost anything.  Most cases can be avoided by following good PM practices.
Treatment in many cases is fluids only for 24 hours.  If that does not work
and no antidiarrheal medication is available, grind chalk, charcoal, or
dried bones into a powder.  Mix one handful of powder with treated water
and administer every 2 hours until diarrhea has slowed or stopped.  Adding
an equal portion of apple pomace or the rinds of citrus fruit to this
mixture makes the mixture more effective.  Tannic acid, which is found in
tea, can also help control diarrhea.  Prepare a strong solution of tea, if
available, and administer 1 cup every 2 hours until diarrhea slows or
stops.  The inner bark of hardwood trees also contains tannic acid.  Boil
the inner bark for 2 hours or more to release the tannic acid.  The
resultant black brew has a vile taste and smell, but it will stop most
cases of diarrhea.

b.  Worms and intestinal parasites.  Infestations can usually be
avoided by maintaining strict preventive medicine measures.  For example,
never go barefooted.  The following home remedies appear to work or at
least control the degree of infestation, but they are not without danger.
Most work on the principle of changing the environment of the
gastrointestinal tract.

(1)  Salt water.  Four tablespoons of salt in 1 quart of water. This should be taken on a one time basis only.

(2)  Tobacco.  Eat 1 to 1 1/2 cigarettes.  The nicotine in the cigarette kills or stuns the worms long enough for them to be passed.  If the infestation is severe, the treatment can be repeated in 24 to 48 hours, but no sooner.

(3)  Kerosene.  Drink 2 tablespoons.  Don't drink more.  The treatment can be repeated in 24 to 48 hours, but no sooner.

(4)  Hot peppers.  Put peppers in soups, rice, meat dishes or eat them raw.  This treatment is not effective unless peppers are made a steady part of the diet.

c.  Sore throats are common and usually can be taken care of by gargling with warm salt water.  If the tongue is coated, scrape it off with a tooth brush, a clean stick, or even a clean fingernail; then gargle with warm salt water.

d.  Skin infections.

(1)  Fungal infections.  Keep the area clean and dry, and expose the area to sunlight as much as possible.

(2)  Heat rash.  Keep the area clean, dry, and cool.  If powder is available, use it on affected area.

(3)  The rule of thumb for all skin diseases is:  "If it is wet, dry it, and if it is dry, wet it."

e.  Burns.  Soak dressings or clean rags that have been boiled for 10 minutes in tannic acid (tea or inner bark of hardwood trees), cool, and apply over the burns.  This relieves the pain somewhat, seems to help speed healing, and offers some protection against infection.

f.  Leaches and ticks.  Apply a lit cigarette or a flaming match to the back of the leach or tick, and it will drop off.  Covering it with moistened tobacco, grease, or oil will also make it drop off.  Do not try to pull it off; part of the head may remain attached to the skin and cause an infection.

g.  Bee, wasp, and hornet stings.  Inspect the wound carefully and remove stinger if present.  Apply baking soda, cold compress, mud, or coconut meat to the area.  Spider, scorpion, and centipede bites can be treated the same way.

h.  Chiggers.  Nail polish applied over the red spots will cut off the chigger's air supply and kill it.  Any variation of this, e.g., tree sap, will work.

22-3.  MAGGOT THERAPY FOR WOUND DEBRIDEMENT.

a.  Introducing maggots into a wound can be hazardous because the wound must be exposed to flies.  Flies, because of their filthy habits, are likely to introduce bacteria into the wound, causing additional complications.  Maggots will also invade live, healthy tissue when the dead tissue is gone or not readily available.  Maggot invasion of healthy tissue

causes extreme pain and hemorrhage, possibly severe enough to be fatal.

b. Despite the hazards involved, maggot therapy should be considered a viable alternative when, in the absence of antibiotics, a wound becomes severely infected, does not heal, and ordinary debridement is impossible.

(1) All bandages should be removed so that the wound is exposed to circulating flies. Flies are attracted to foul or fetid odors coming from the infected wound; they will not deposit eggs on fresh, clean wounds.

(2) In order to limit further contamination of the wound by disease organisms carried by the flies, those flies attracted to the wound should not be permitted to light directly on the wound surface. Instead, their activity should be restricted to the intact skin surface along the edge of the wound. Live maggots deposited here and/or maggots hatching from eggs deposited here will find their way into the wound with less additional contamination than if the flies were allowed free access to the wound.

(3) One exposure to the flies is usually all that is necessary to insure more than enough maggots for thorough debridement of a wound. Therefore, after the flies have deposited eggs, the wound should be covered with a bandage.

(4) The bandage should be removed daily to check for maggots. If no maggots are observed in the wound within 2 days after exposure to the flies, the bandage should be removed and the wound should be re-exposed. If the wound is found to be teeming with maggots when the bandage is removed, as many as possible should be removed using forceps or some other sterilized instrument or by flushing with sterile water. Only 50-100 maggots should be allowed to remain in the wound.

(5) Once the maggots have become established in the wound, it should be covered with a bandage again, but the maggot activity should be monitored closely each day. A frothy fluid produced by the maggots will make it difficult to see them. This fluid should be "sponged out" of the wound with an absorbent cloth so that all of the maggots in the wound can be seen. Care should be taken not to remove the maggots with the fluid.

(6) The period of time necessary for maggot debridement of a wound depends on a number of factors, including the depth and extent of the wound, the part of the body affected, the number of maggots present in the wound, and the fly species involved. In a survival situation, an individual will be able to control only one of these factors--the number, and sometimes not even that; therefore, the exact time to remove the maggots cannot be given in specific numbers of hours or days. However, it can be said with certainty that the maggots should be removed immediately once they have removed all the dead tissue and before they have become established in healthy tissue. When the maggots begin feeding on normal, healthy tissue, the individual will experience an increased level of pain at the site of the wound as the maggots come into contact with "live" nerves. Bright red blood in the wound also indicates that the maggots have reached healthy tissue.

(7) The maggots should be removed by flushing the wound repeatedly with sterile water. When all the maggots have been removed, the wound should be bandaged. To insure that the wound is free of maggots, check it every 4 hours or more often for several days. Any remaining

maggots should be removed with sterilized forceps or by flushing with sterile water.

(8) Once all of the maggots have been removed, bandage the wound and treat it as any other wound. It should heal normally provided there are no further complications.

22-4. SUMMARY. The treatments discussed in this chapter are by no means all of the primitive treatments or home remedies available for use. Most people have their own home remedy for various problems. Some work, some don't. The ones presented here have been used and do work, although some can be dangerous. The lack of modern medicine does not rule out medical treatment. Common sense, determination to succeed, and advice from the natives in the area on primitive treatments can provide the solution to a medical problem. Just keep one thing in mind: "First I shall do no harm."
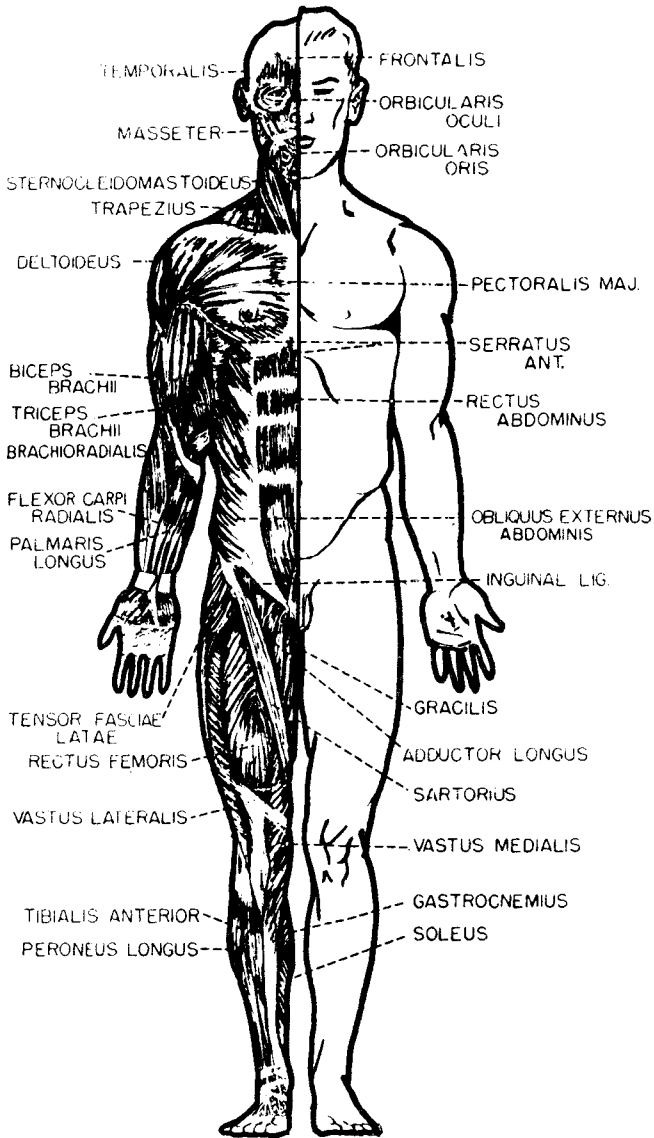
Figure 1. Important superficial
muscles, anterior view.

A-1
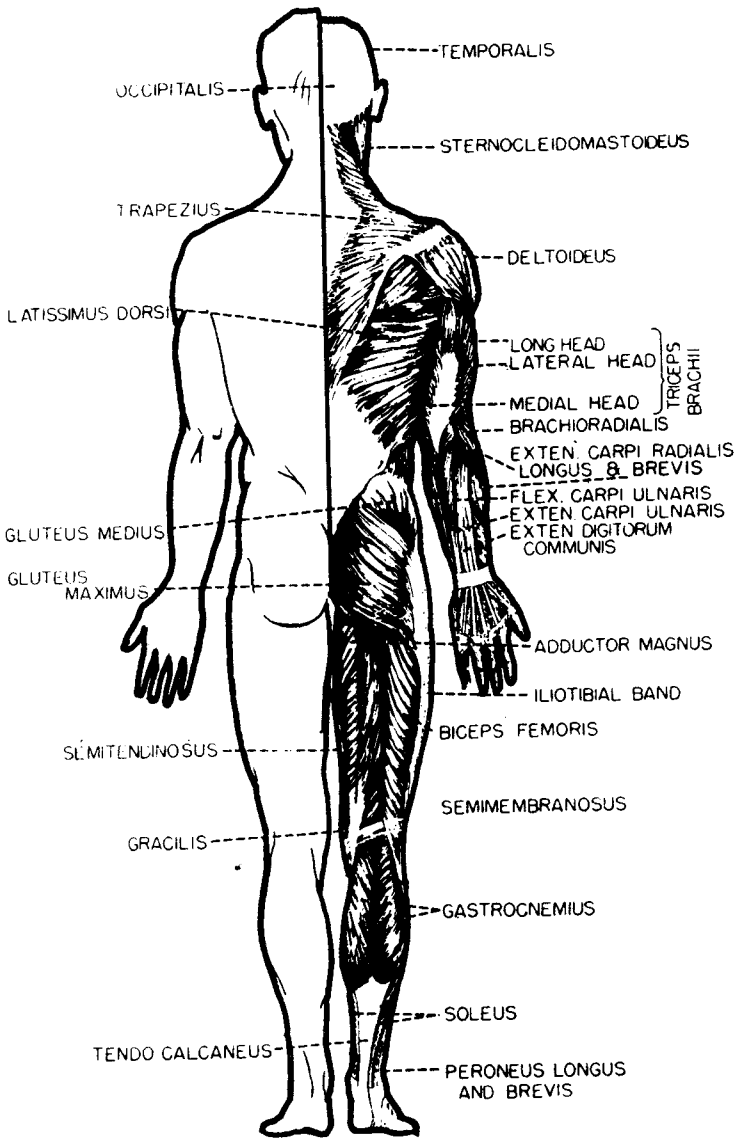
Figure 2. Important superficial muscles, posterior view.
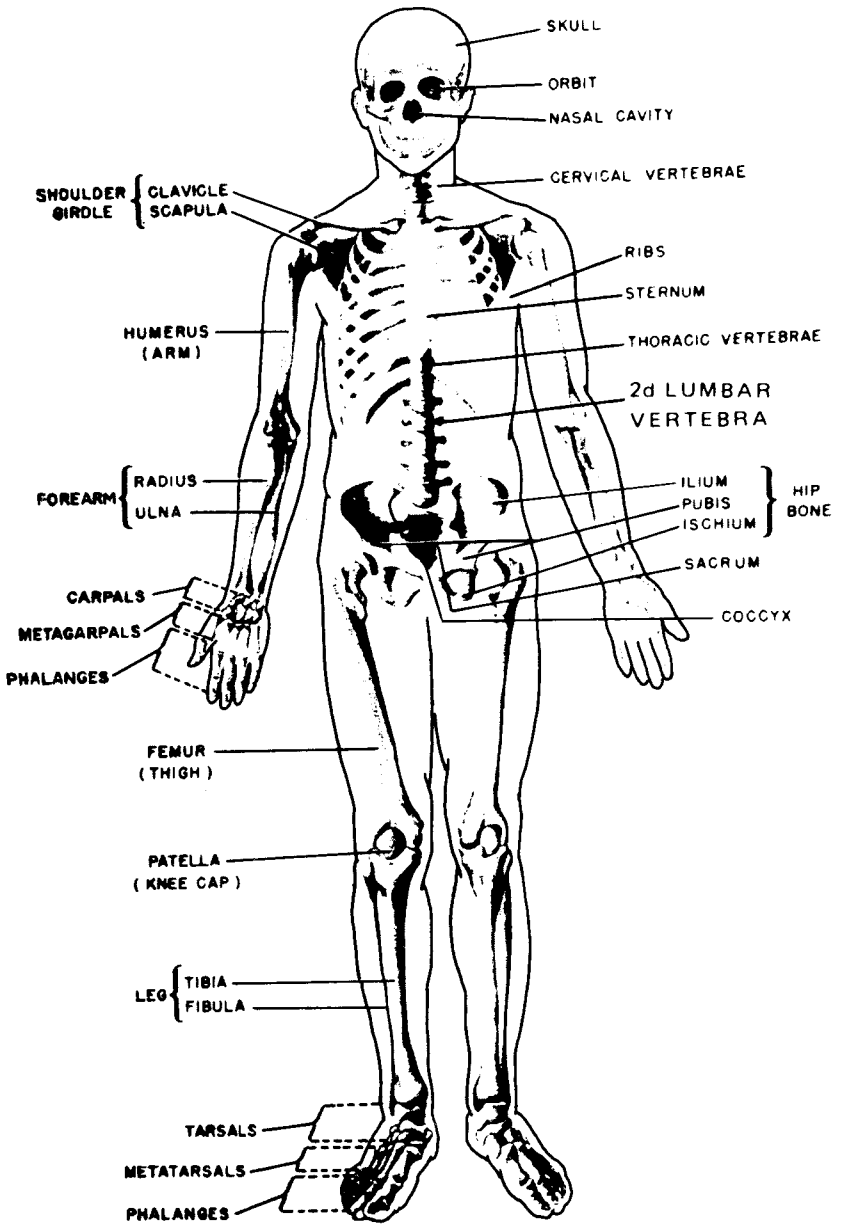
Figure 3. Human skeleton.

A-3

Figure 4. Lateral view.

FRONTAL BONE · SUPERCILIARY ARCH · PARIETAL BONE · GLABELLA · CORONAL SUTURE · NASAL BONE · LACRIMAL BONE · ETHMOID BONE · SPHENOID BONE · TEMPORAL BONE · ZYGOMA · OPTIC FORAMEN · MAXILLA · NASAL CAVITY · SEPTUM OF THE NOSE · MANDIBLE

FRONTAL VIEW

CORONAL SUTURE · SQUAMOUS SUTURE · SPHENOID BONE · PARIETAL BONE · FRONTAL BONE · NASAL BONE · LACRIMAL BONE · ETHMOID BONE · LAMBOIDAL SUTURE · TEMPORAL BONE · OCCIPITAL BONE · STYLOID PROCESS · EXTERNAL AUDITORY MEATUS · MASTOID PROCESS · ZYGOMATIC BONE · MAXILLA · ZYGOMATIC ARCH · MANDIBLE

Scalp · Periosteum · Bone of cranium · Meninges · Dura matter · Subdural space · Arachnoid · Subarachnoid space · Pia mater · Brain tissue

# Figure 5. The skull.

A-5

ATLAS

AXIS

3-7

7th CERVICAL V.

CERVICAL
VERTEBRAE

THORACIC
VERTEBRAE

1-12

SPINAL CORD

DURA MATER

1-5

LUMBAR
VERTEBRAE

5 Fused

SACRUM

COCCYX    3-5 Fused

Figure 6. Vertebral column.
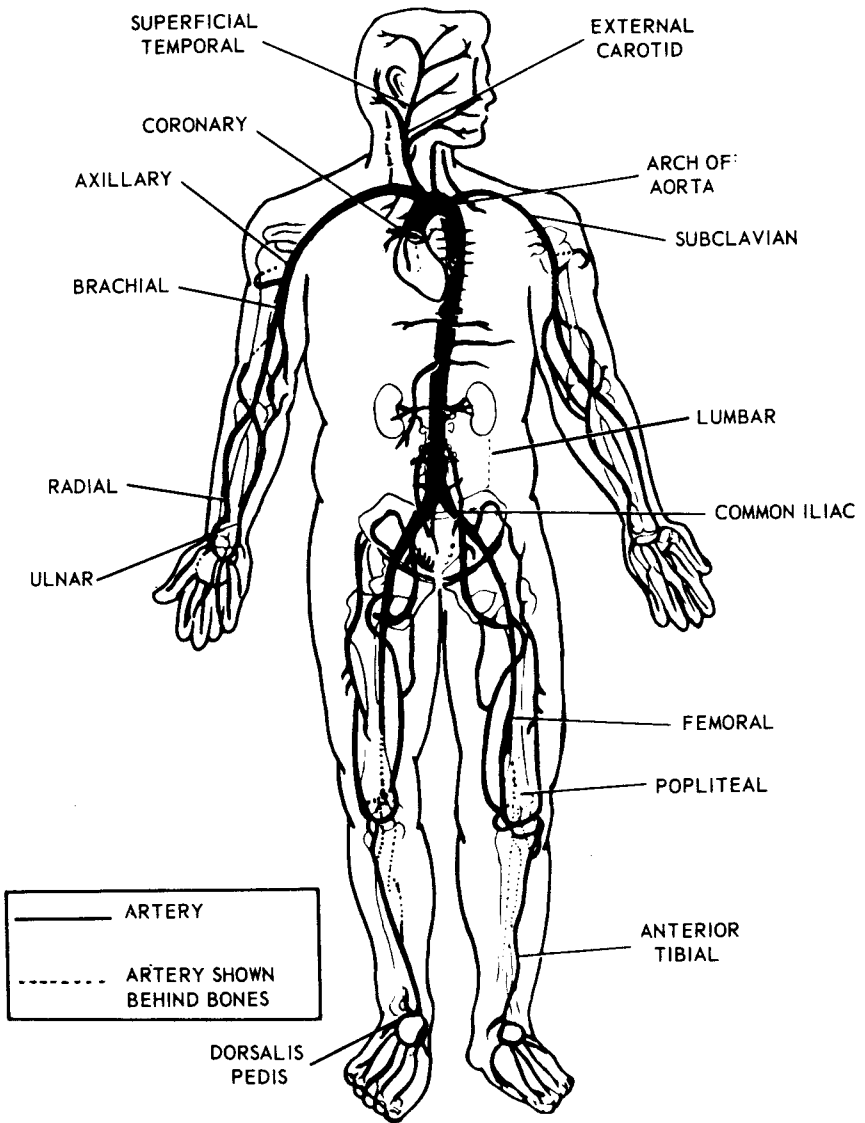
Figure 7. Large arteries of the systemic circulation.

Figure 8. Large veins of the systemic circulation.

SUPERFICIAL VEINS
DEEP VEINS
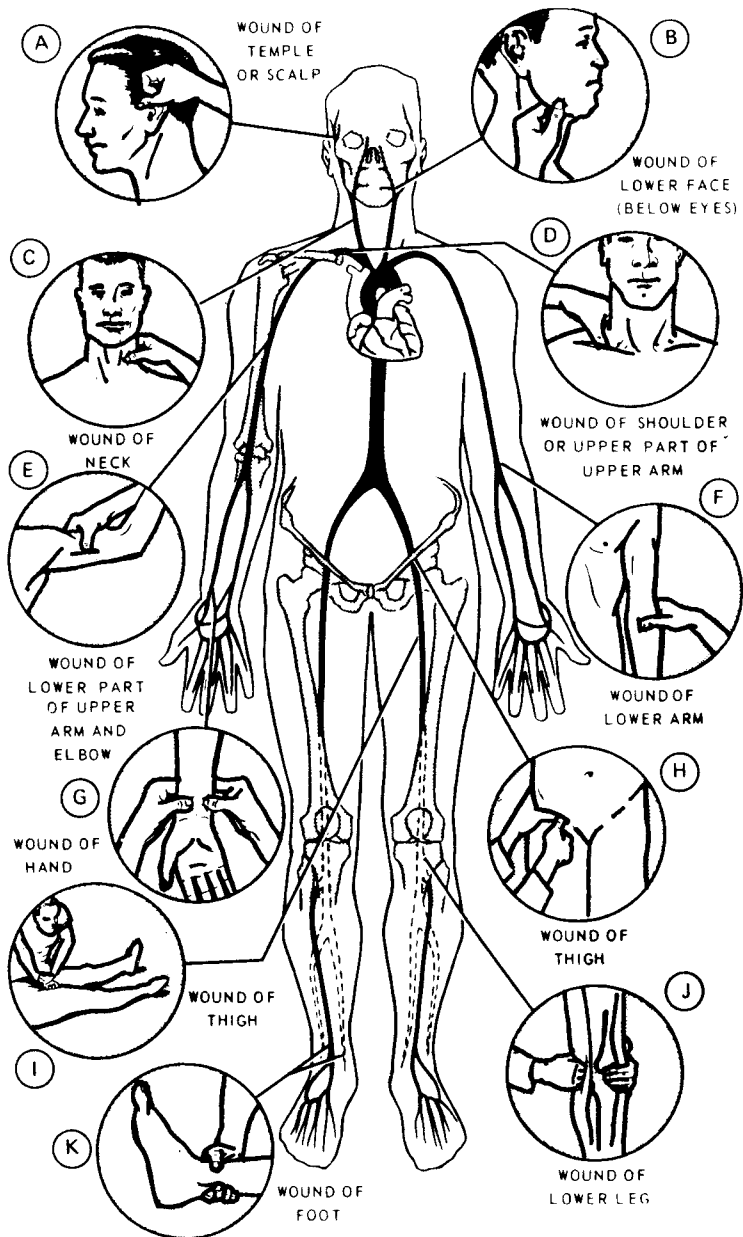
Figure 9. Pressure points for hemorrhage control.
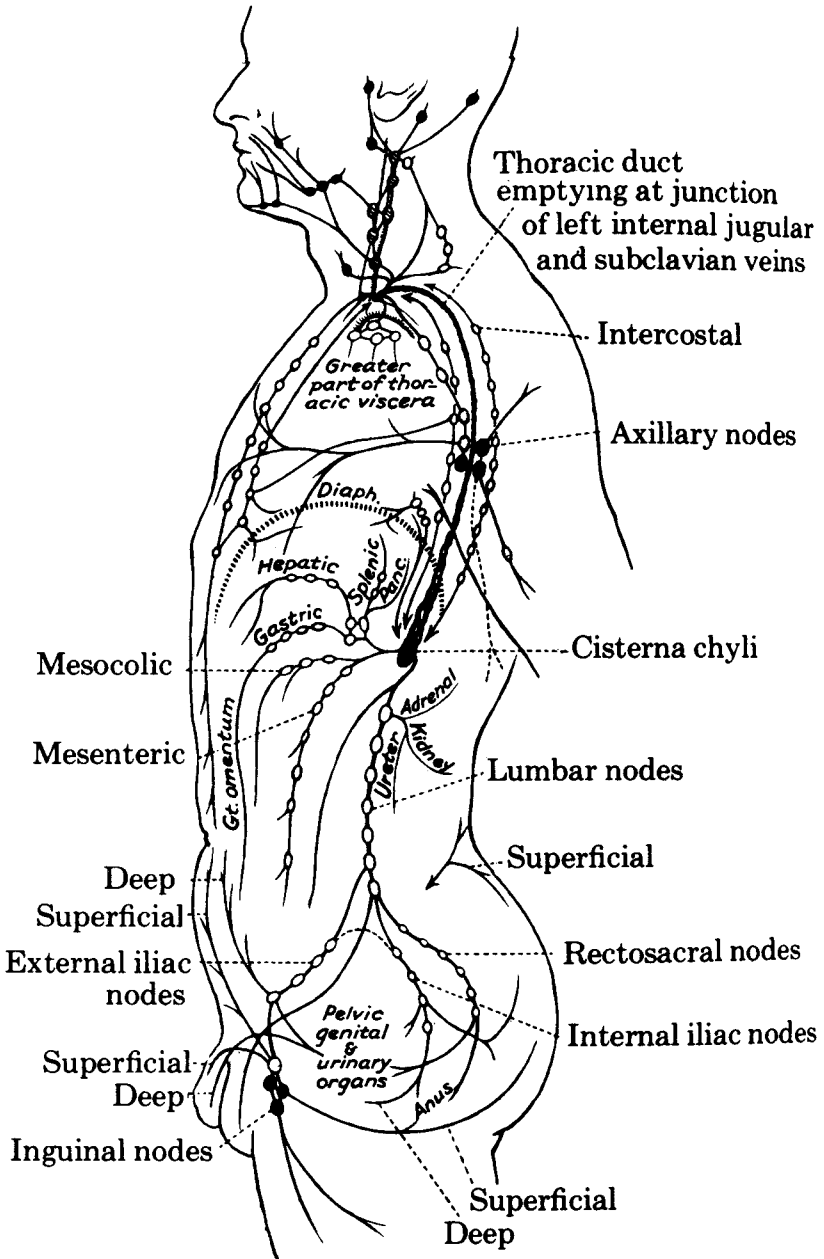
Figure 10. Lymphatic drainage of the body.
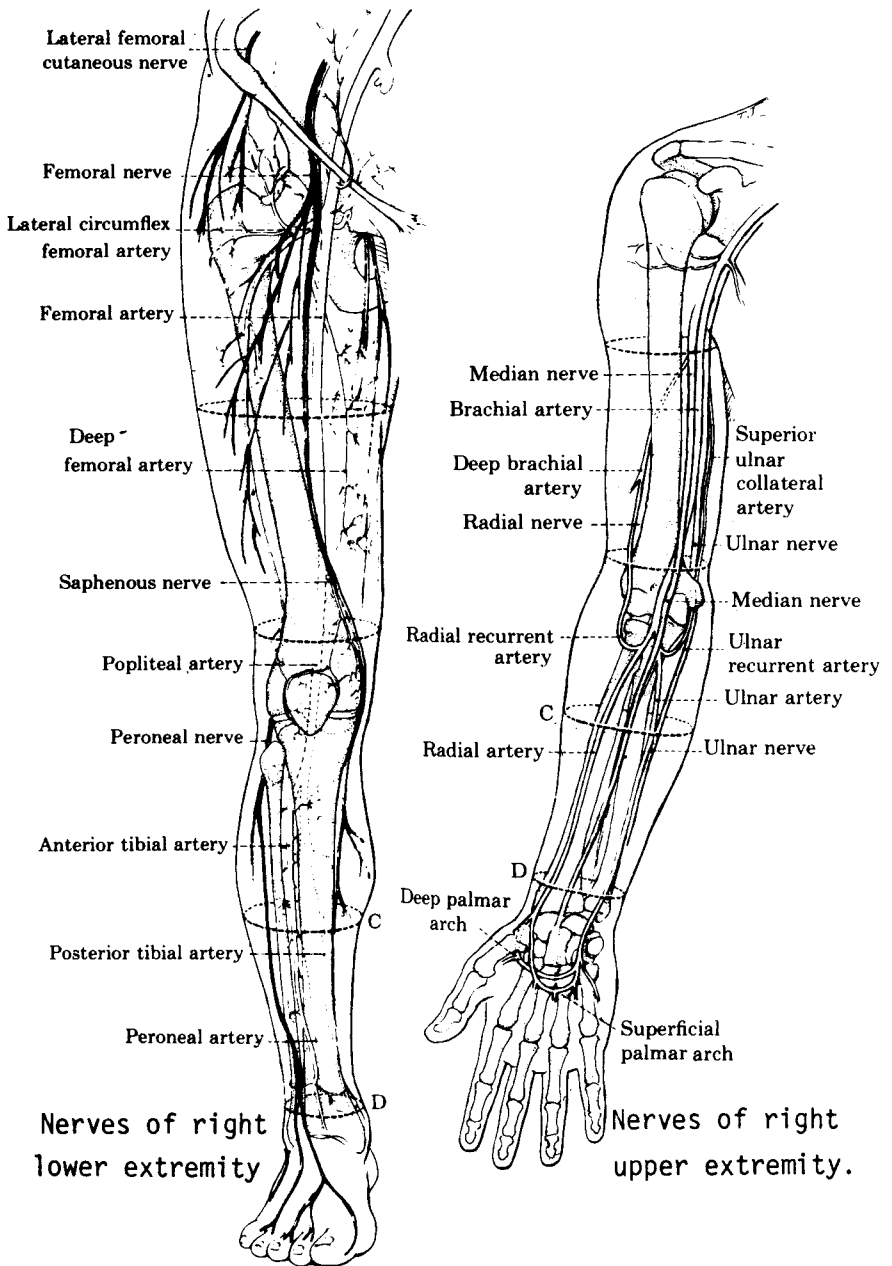
Figure 11. Nerves of the extremities.
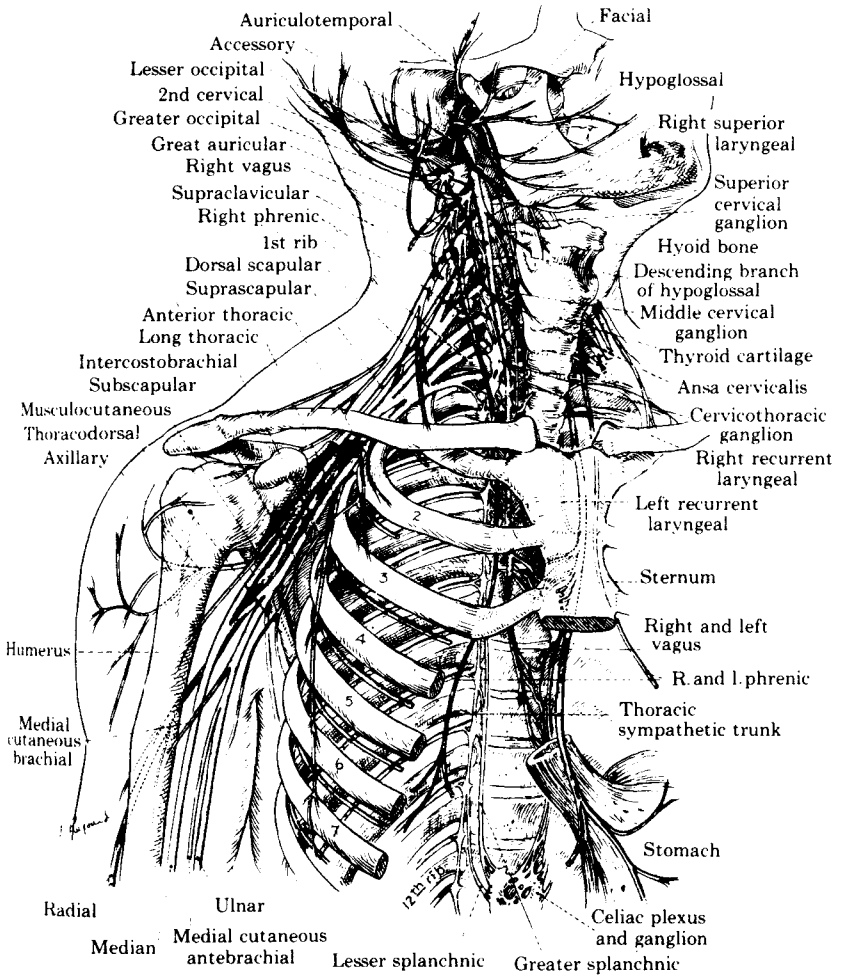
Figure 12. Deep nerves of neck, axilla, and upper thorax.
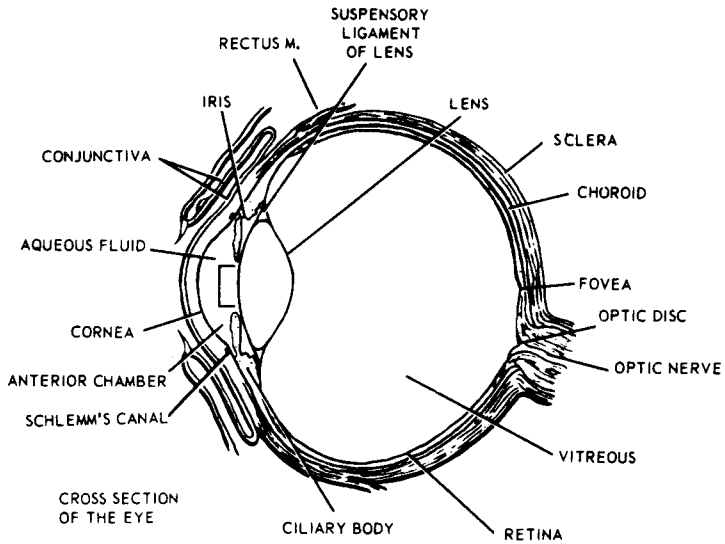
**Figure 13. The eye.**
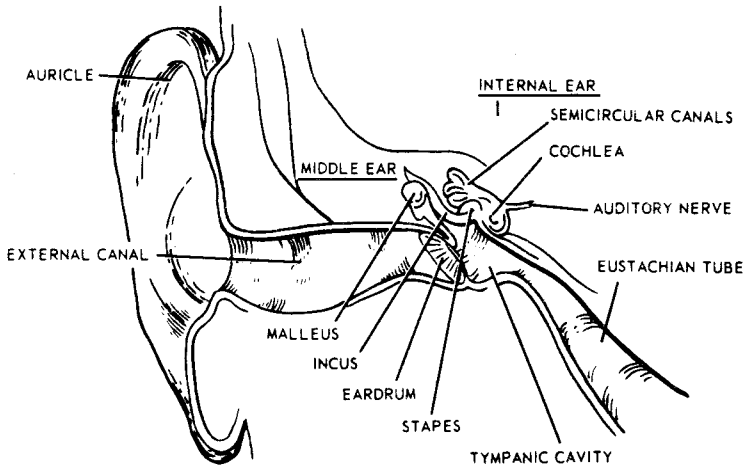


**Figure 14. The ear.**
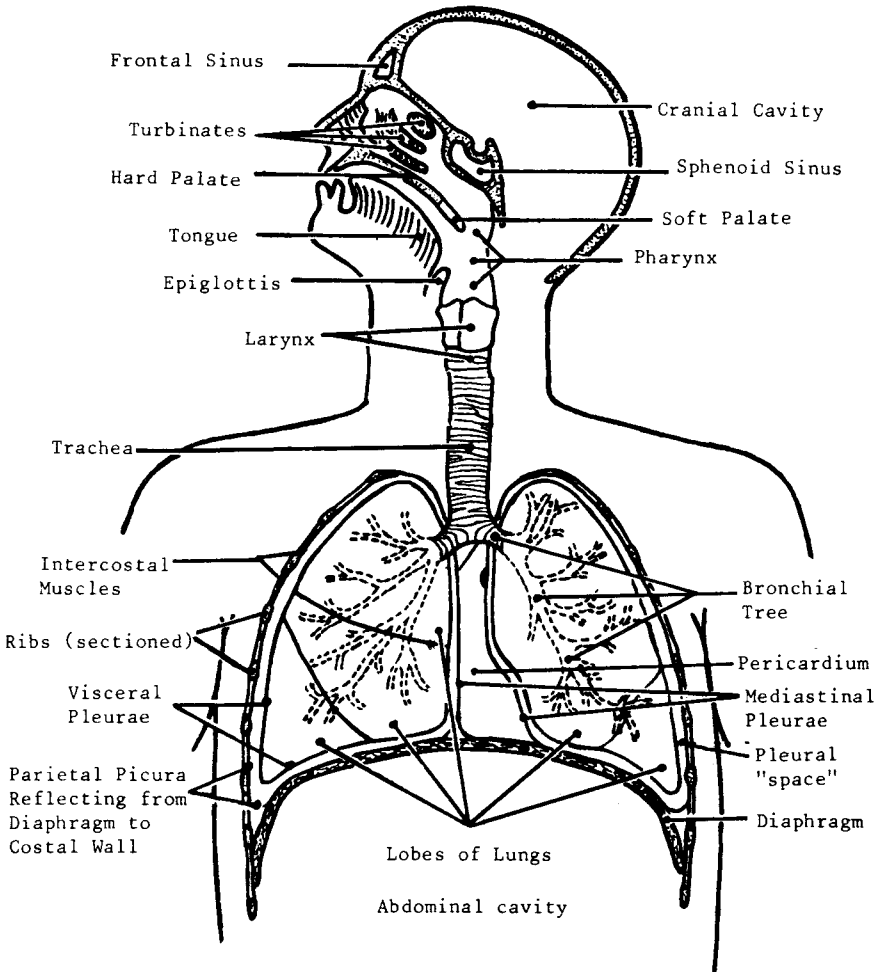
Figure 15. Schematic of the tract.
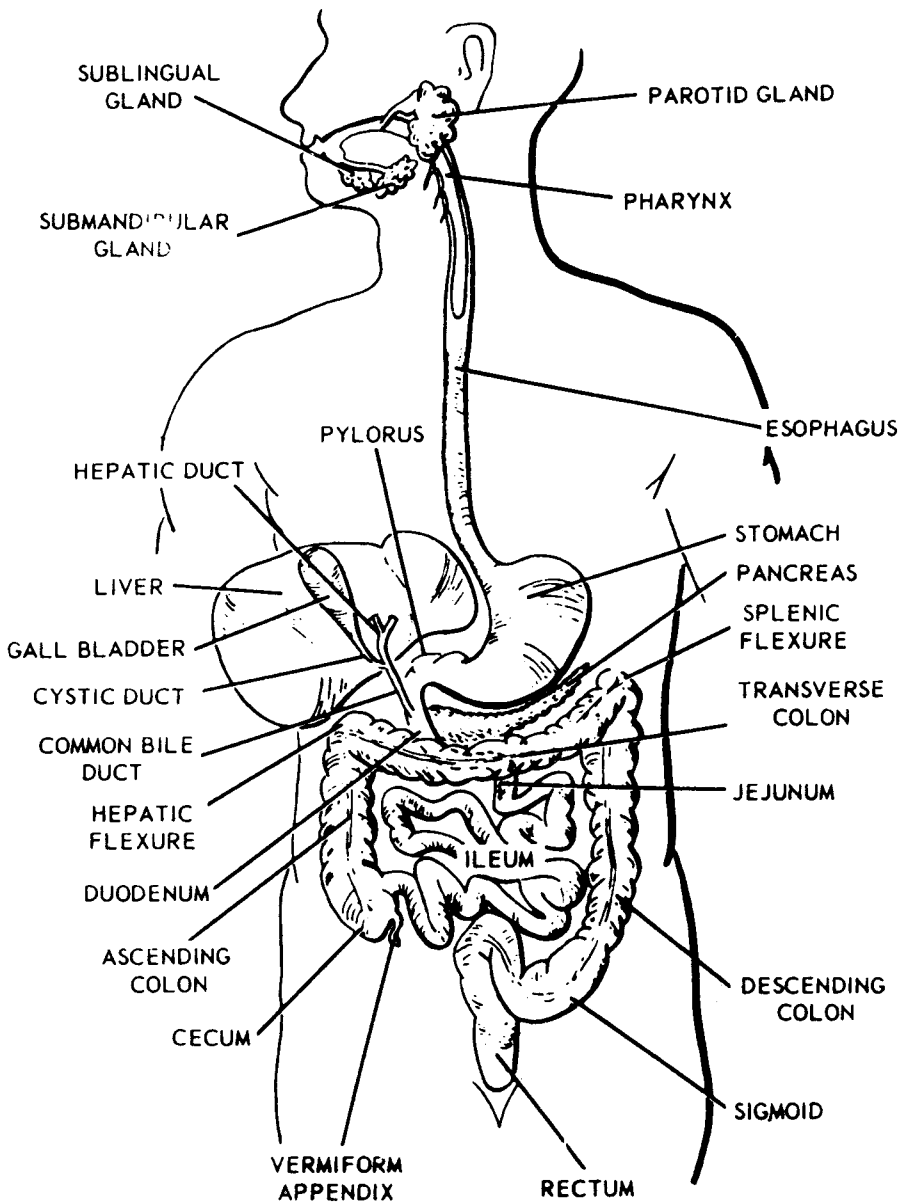
Figure 16. Digestive system.
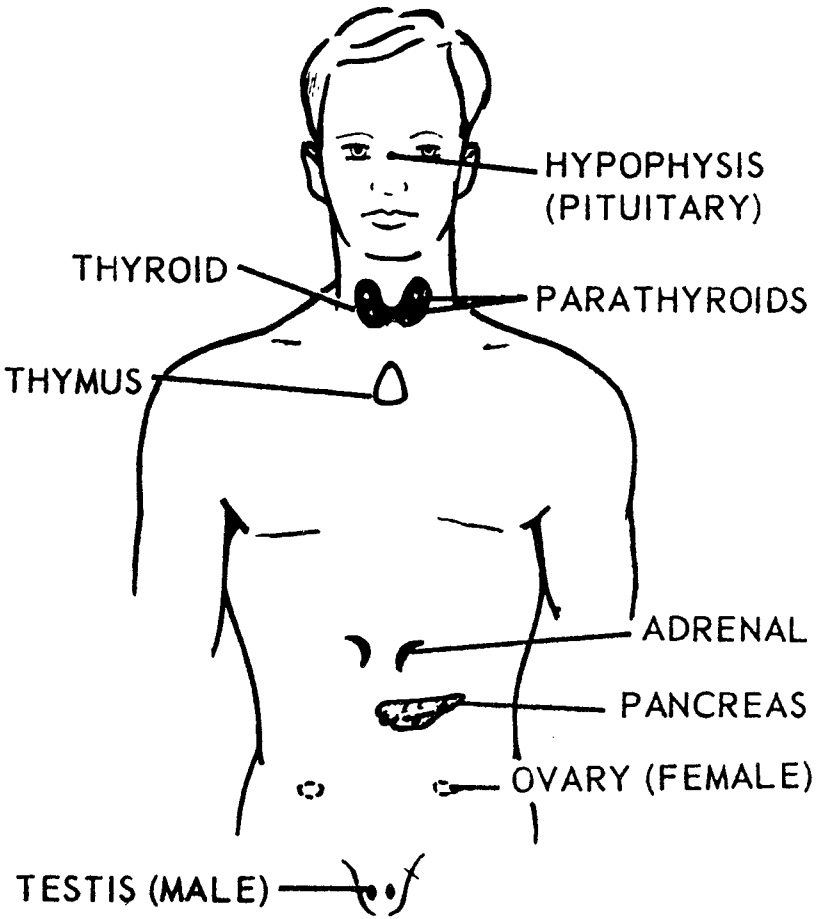
Figure 17. Endocrine system.
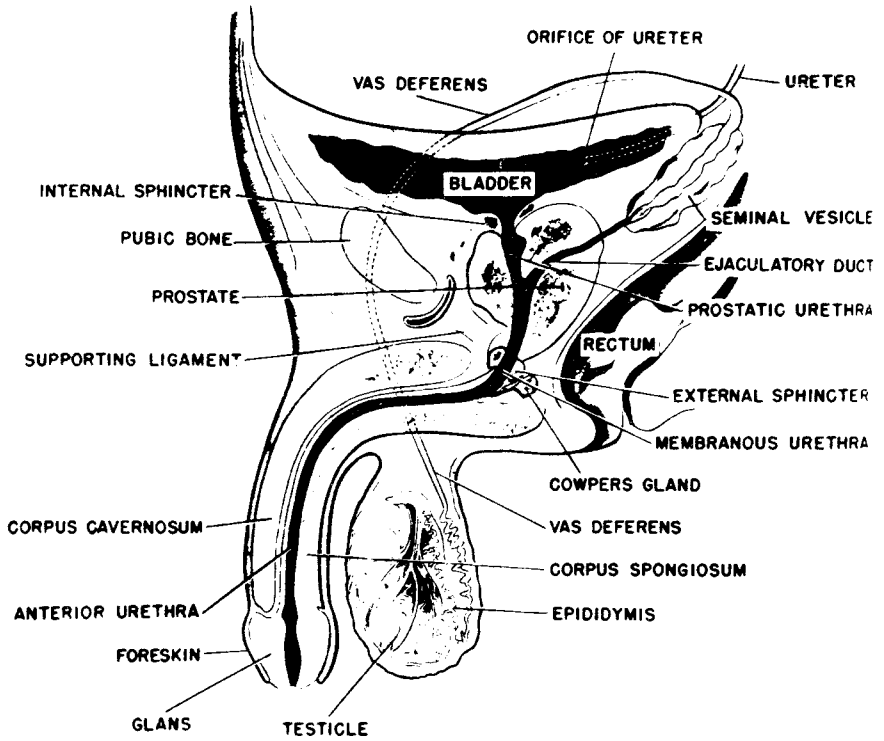
Figure 18. Male genital organs.
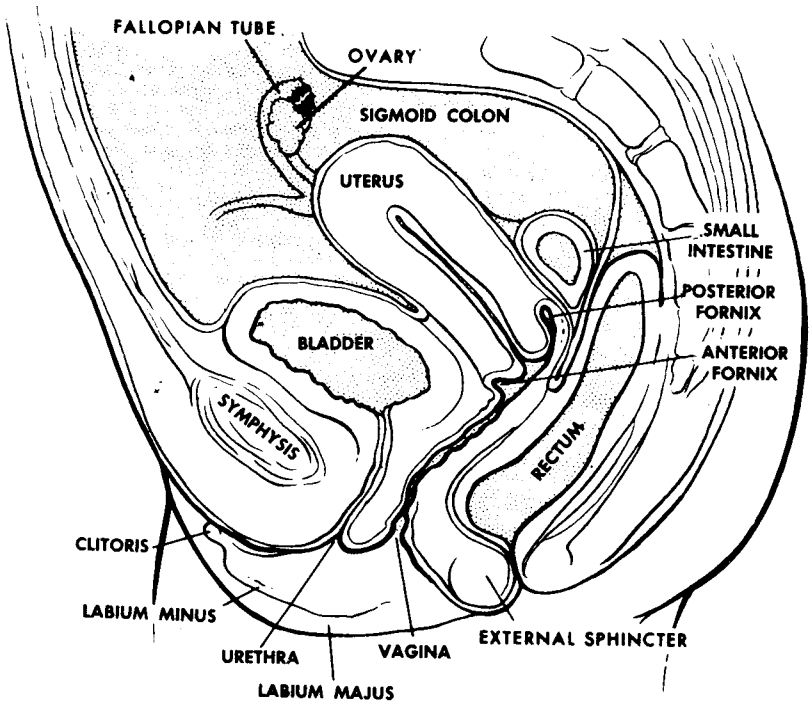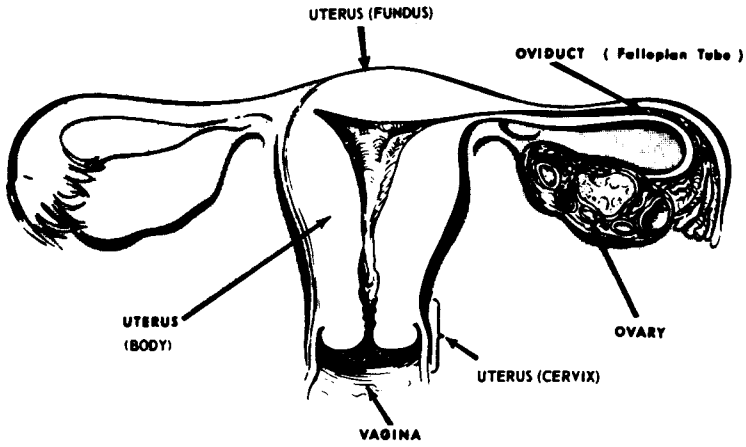
Figure 19. Female genital organs.

Bacteriological and Parasitic Plates

B-1 Bacteriological
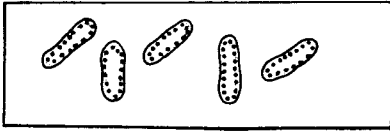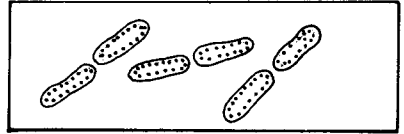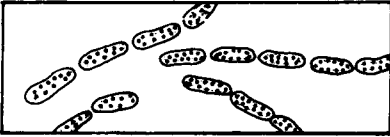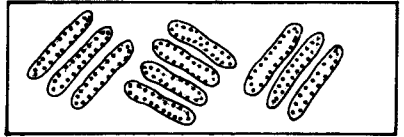


ARRANGEMENT OF BACILLI
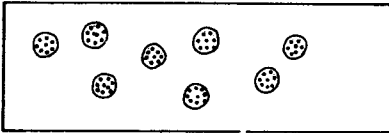


ARRANGEMENT OF COCCI
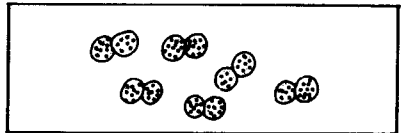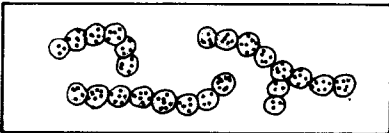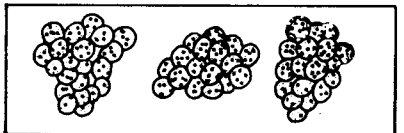
ARRANGEMENT OF BACTERIAL CELL

| Arrangement | | Terminology |
|---|---|---|
| COCCUS | | |
| single | (A)...... | coccus |
| pair | (B)...... | diplococcus |
| chain | (C)...... | streptococcus |
| cluster | (D)...... | staphylococcus |
| four | (E)...... | tetrad (gaffkya) |
| eight | (E)...... | cube (sarcina) |
| | | |
| BACILLUS | | |
| single | (A)...... | bacillus |
| pair | (B)...... | diplobacillus |
| chain | (C)...... | streptobacillus |
| palisade | (D)...... | palisade |
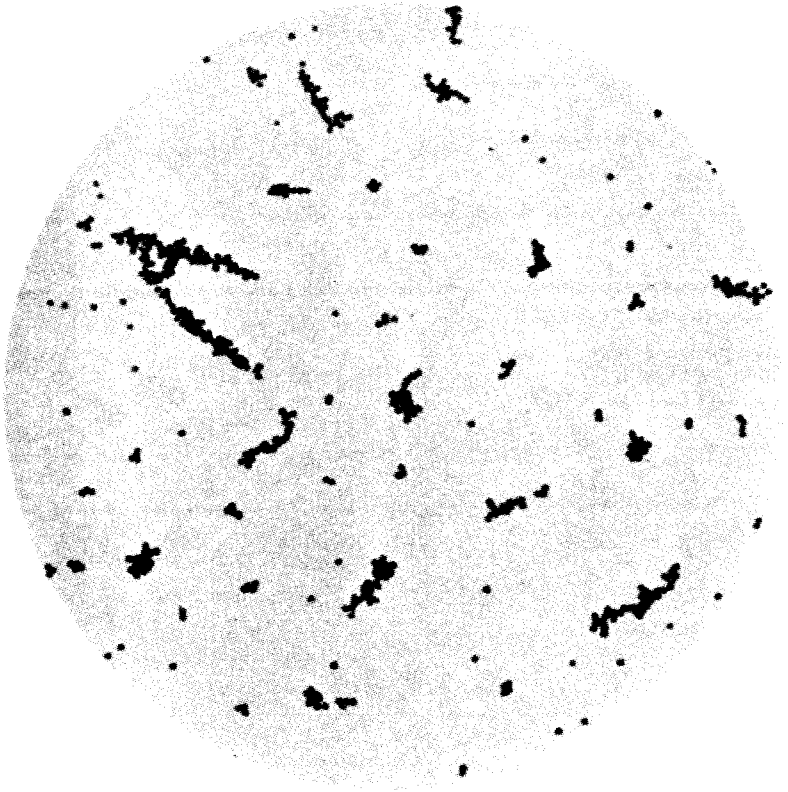
Figure 1. Gram-stained smear of
Staphylococcus.
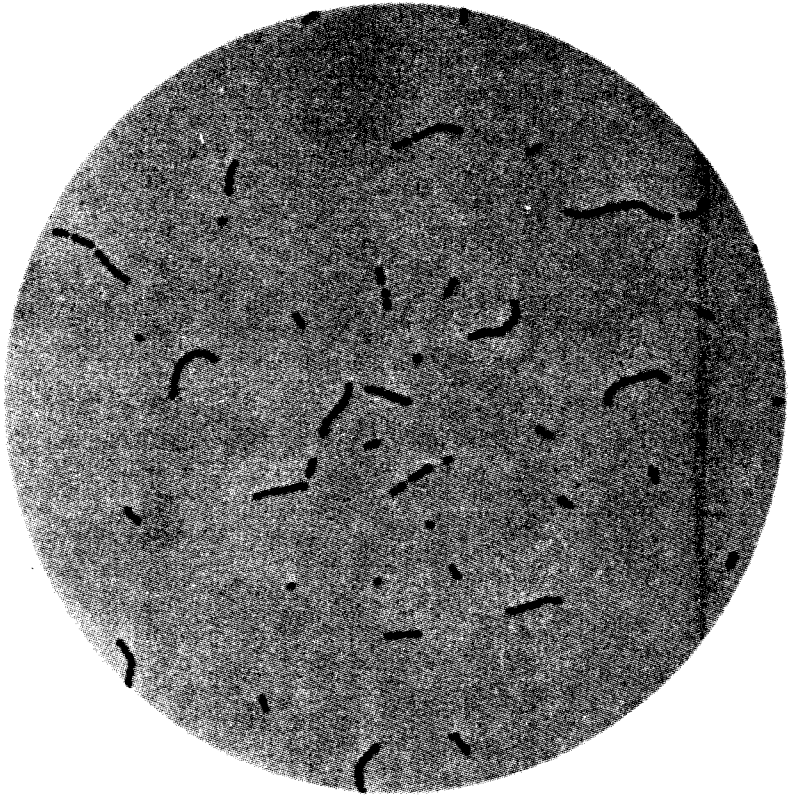
Figure 2. Gram-stained smear of
Streptococcus.
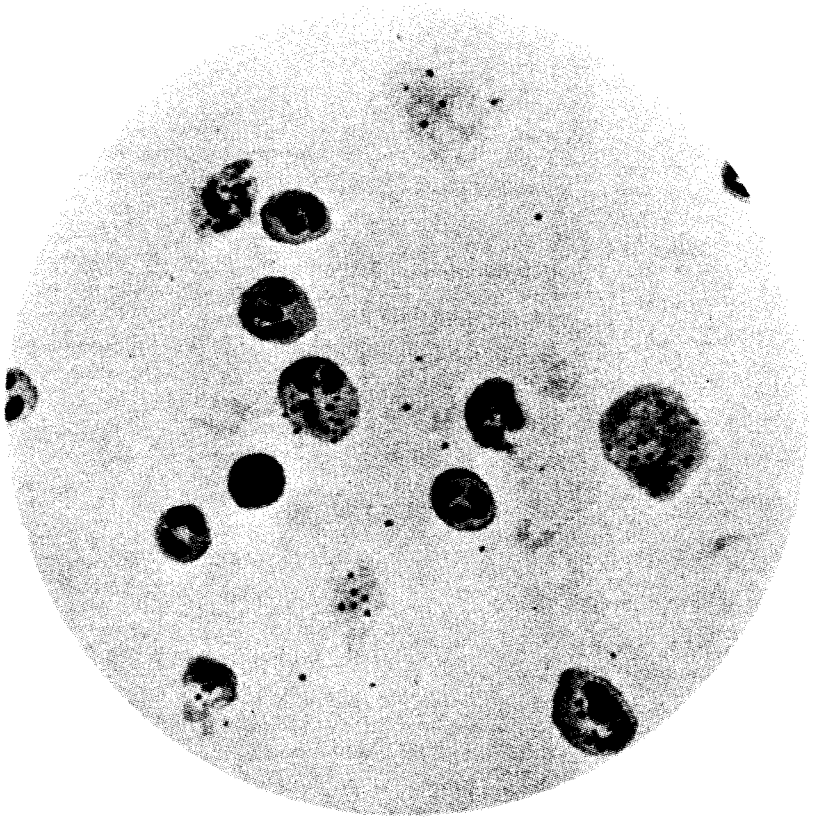
Figure 3. Gram-stained smear of Neisseria gonorrhea from urethral exudate.
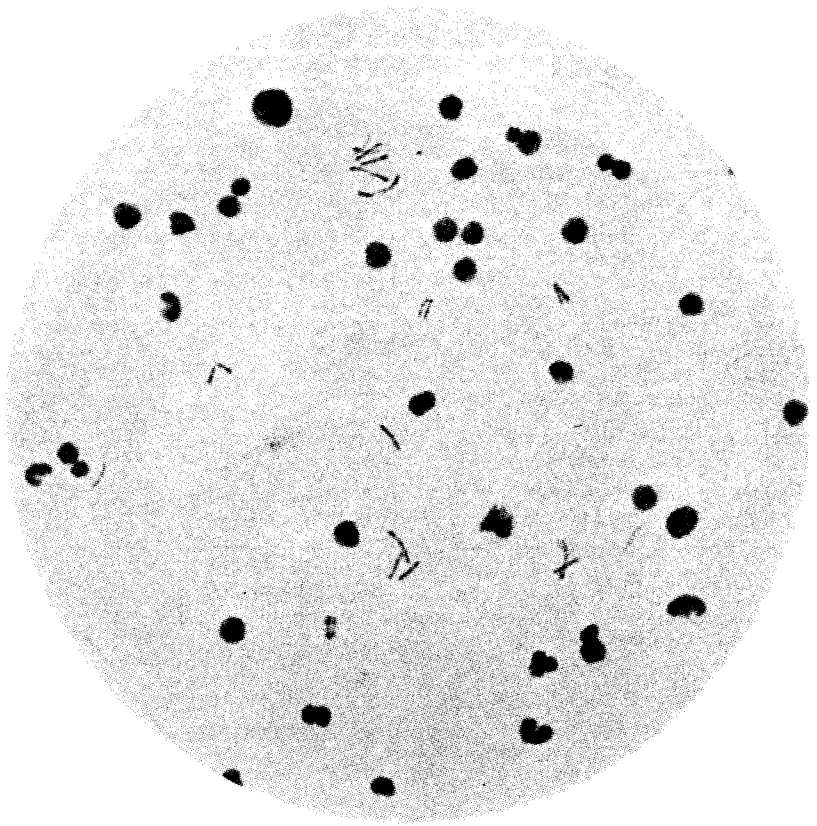
Figure 4. Acid-fast stained smear of
Mycobacterium tuberculosis in sputum.
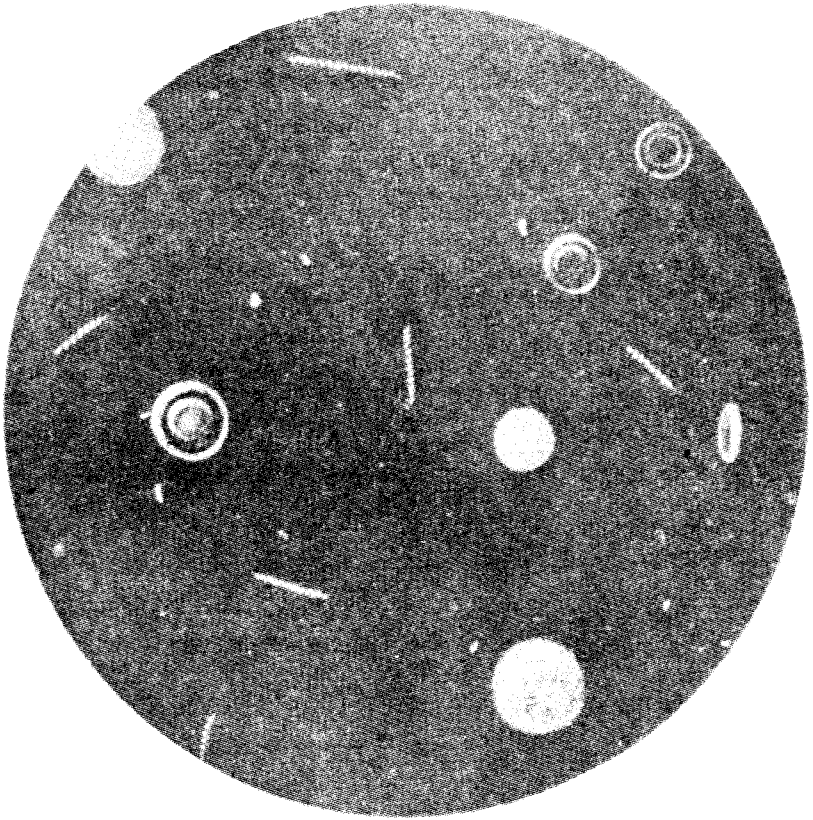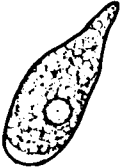
Figure 5. Dark-field mount of Treponema pallidum in exudate from penile lesion.

# DEVELOPMENT OF BLOOD CELLS X 1500

**EMBRYO**

MESENCHYME
BLOOD ISLANDS-YOLK SAC

LIVER-SPLEEN

RETICULO-ENDOTHELIAL CELL
(PARENT CELL OF ALL BLOOD CELLS)

LYMPH GLANDS, SPLEEN, ETC.

RED BONE MARROW

**IMMATURE CELLS**

MONOBLAST

LYMPHOBLAST

MYELOBLAST

RUBRIBLAST

PROLYMPHOCYTE

PROGRANULOCYTE

PRORUBRICYTE

PROMEGAKARYOCYTE

NEUTROPHILIC MYELOCYTE

BASOPHILIC MYELOCYTE

RUBRICYTE

PROMONOCYTE

EOSINOPHILIC MYELOCYTE

NEUTROPHILIC METAMYELOCYTE

BASOPHILIC METAMYELOCYTE

METARUBRICYTE

EOSINOPHILIC METAMYELOCYTE

MEGAKARYOCYTE

NEUTROPHILIC BAND

**MATURE**

SEGMENTED NEUTROPHIL

EOSINOPHILIC BAND

BASOPHILIC BAND

RETICULOCYTE

MONOCYTE

LYMPHOCYTE

HYPERSEGMENTED NEUTROPHIL

EOSINOPHIL

BASOPHIL

ERYTHROCYTE

THROMBOCYTE

| Intestine | | | |
|---|---|---|---|
| | Entamoeba histolytica | Entamoeba hartmanni | Entamoeba coli | Entamoeba polecki* |

| | Endolimax nana | Iodamoeba bütschlii | Dientamoeba fragilis | Entamoeba gingivalis |
|---|---|---|---|---|
| | | | | Mouth |
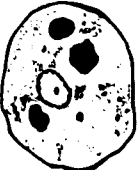
Figure 7. Intestinal protozoa and related species in man: Amebae.
Iron-hematoxylin stain.

Microfilariae
from blood

Wuchereria bancrofti

Brugia malayi

Filariasis

| Diphyllobothrium latum | Taenia saginata | Taenia solium | Dipylidium caninum | Hymenolepis diminuta | Hymenolepis nana |
|---|---|---|---|---|---|
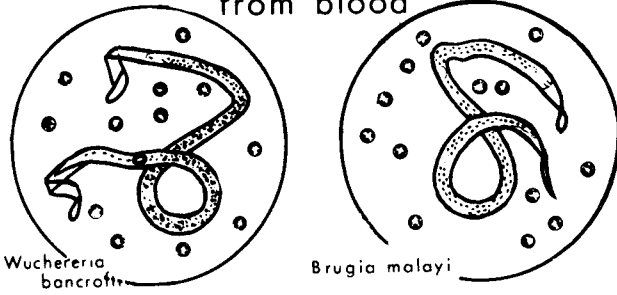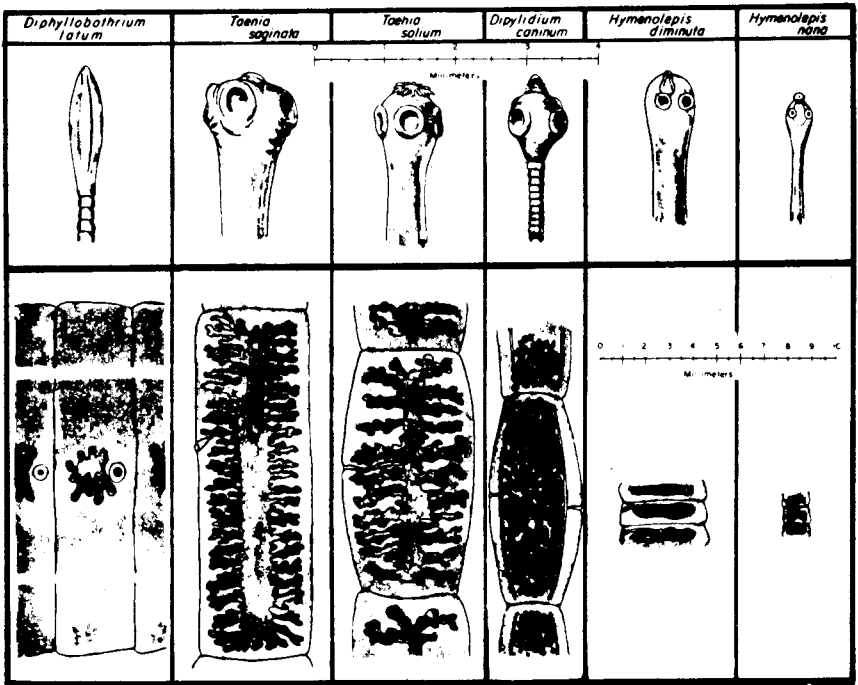
Figure 8. Scoleces and gravid proglottids of the cestode parasites commonly found in humans.

| INTESTINE | | | |
|---|---|---|---|
| *Chilomastix mesnili* | *Giardia lamblia* | *Enteromonas hominis* | *Retortamonas intestinalis* |

| UROGENITAL TRACT | ORAL CAVITY | |
|---|---|---|
| *Trichomonas vaginalis* | *Trichomonas tenax* | *Trichomonas hominis* |
| No Cyst | No Cyst | No Cyst |

Figure 9. Intestinal protozoa and related species in man: Flagellates.
Iron-hematoxylin stain.
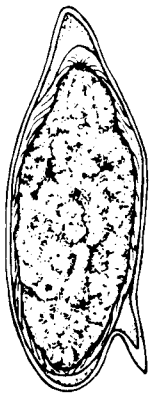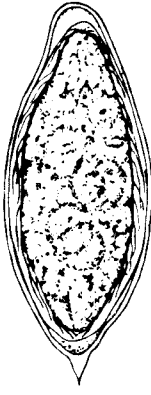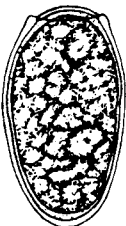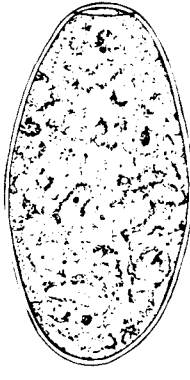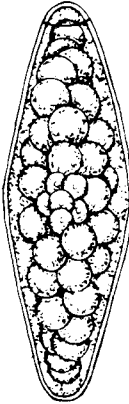
| TREMATODES Scale: 0 24 48 Microns | | | Clonorchis sinensis |
|---|---|---|---|
| Schistosoma japonicum | Schistosoma mansoni | Schistosoma haematobium 1 | Paragonimus westermani 2 |

[1]Usually passed in urine     [2]Usually found in sputum

| Opisthorchis felineus | Heterophyes heterophyes | Metagonimus yokogawai | Dicrocoelium dendriticum |
|---|---|---|---|

| Fasciola hepatica | Fasciolopsis buski | Gastrodiscoides hominis |
|---|---|---|

Figure 10. Trematode eggs found in humans.

(Adults)



A human schistosome

Gastrodiscoides hominis
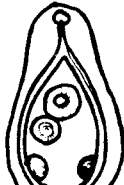
Heterophyes heterophyes

Echinostoma ilocanum

Suckers

Intestine

Testers
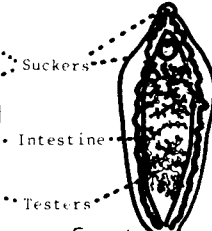
Fasciola hepatica

Fasciolopsis buski
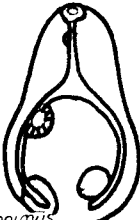
Metagonimus yokogawai

Clonorchis sinensis

Opisthorchis felineus

Paragonimus westermani

COMPARATIVE SIZE

mm

Fasciolopsis

Fascida

Clonorchis

Schistosoma

Paragonimus

Opisthorchis

Echinostoma

Metagonimus

Heterophyes
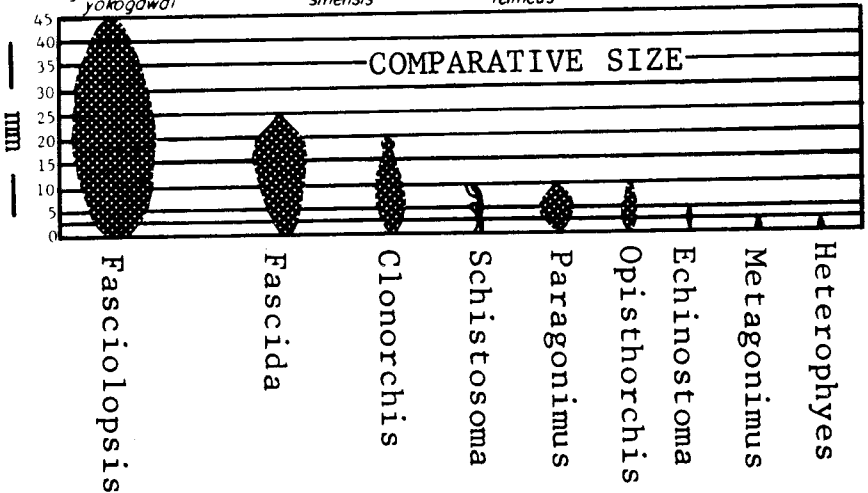
Figure 11. Different morphology of adult trematodes infecting humans.
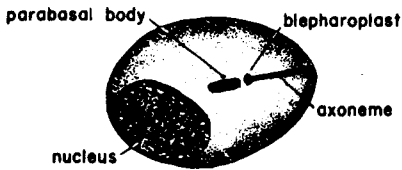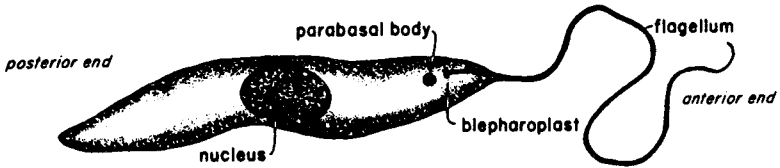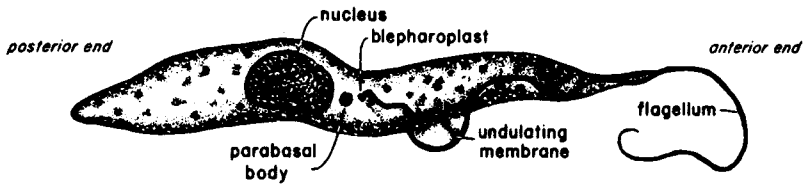
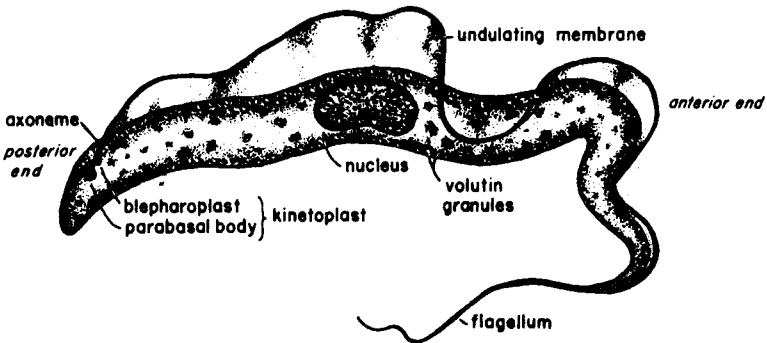Figure 12. Nematode eggs found in humans.
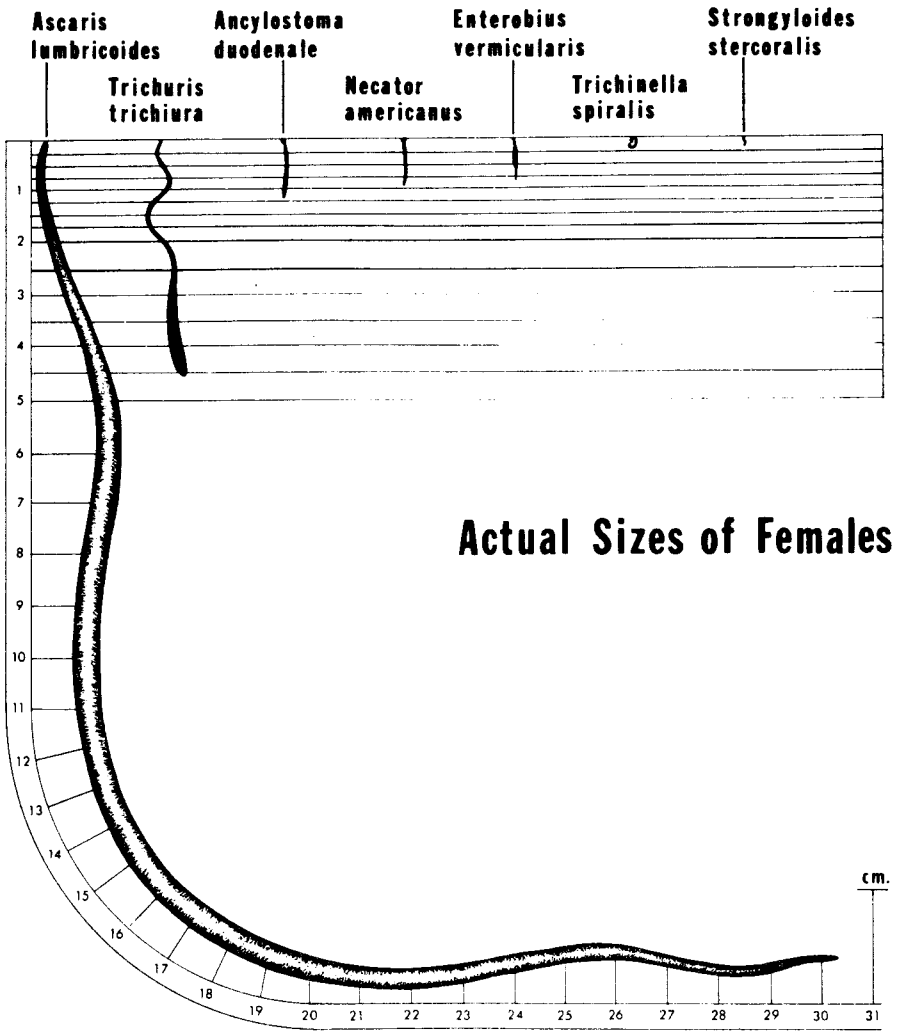
Figure 13. Relative sizes of intestinal roundworms.

AMASTIGOTE (Leishmania form)

PROMASTIGOTE (Leptomonas form)

EPIMASTIGOTE (Crithidia form)

TRYPOMASTIGOTE (Trypanosome form)

Figure 14. Morphological forms of hemoflagellates. Giemsa's stain. Greatly enlarged.

Figure 15. Objects in feces
resembling protozoans.

AMASTIGOTE (Leishmania form)
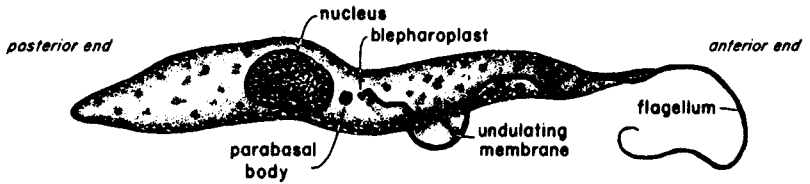
PROMASTIGOTE (Leptomonas form)

EPIMASTIGOTE (Crithidia form)

TRYPOMASTIGOTE (Trypanosome form)

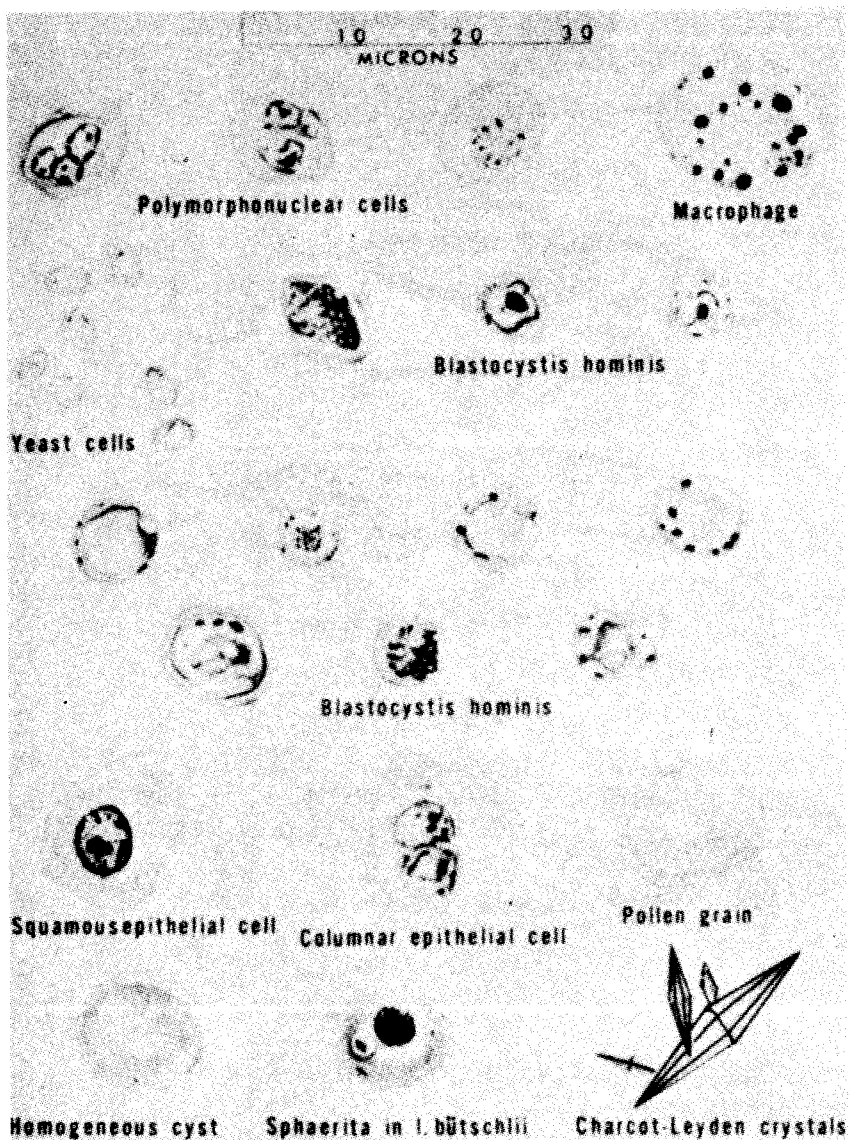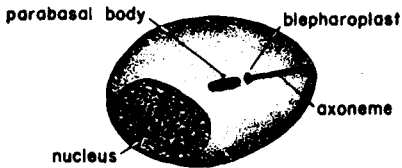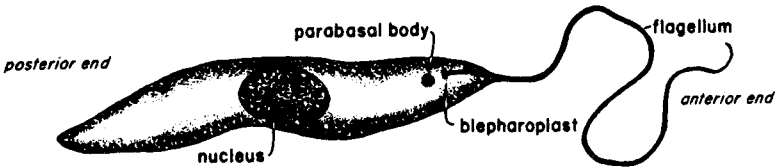Figure 14. Morphological forms of hemoflagellates. Giemsa's stain. Greatly enlarged.

Figure 15. Objects in feces
resembling protozoans.

Pollen grain, resembles *Ascaris* or *Taenia*

Diatom and unknown food remains

Unknown food remains, resembles infertile *Ascaris*

Mite egg, resembles nematode egg

Pseudoparasite (beaver body) from crayfish

*Heteroderma marioni* plant nematode egg
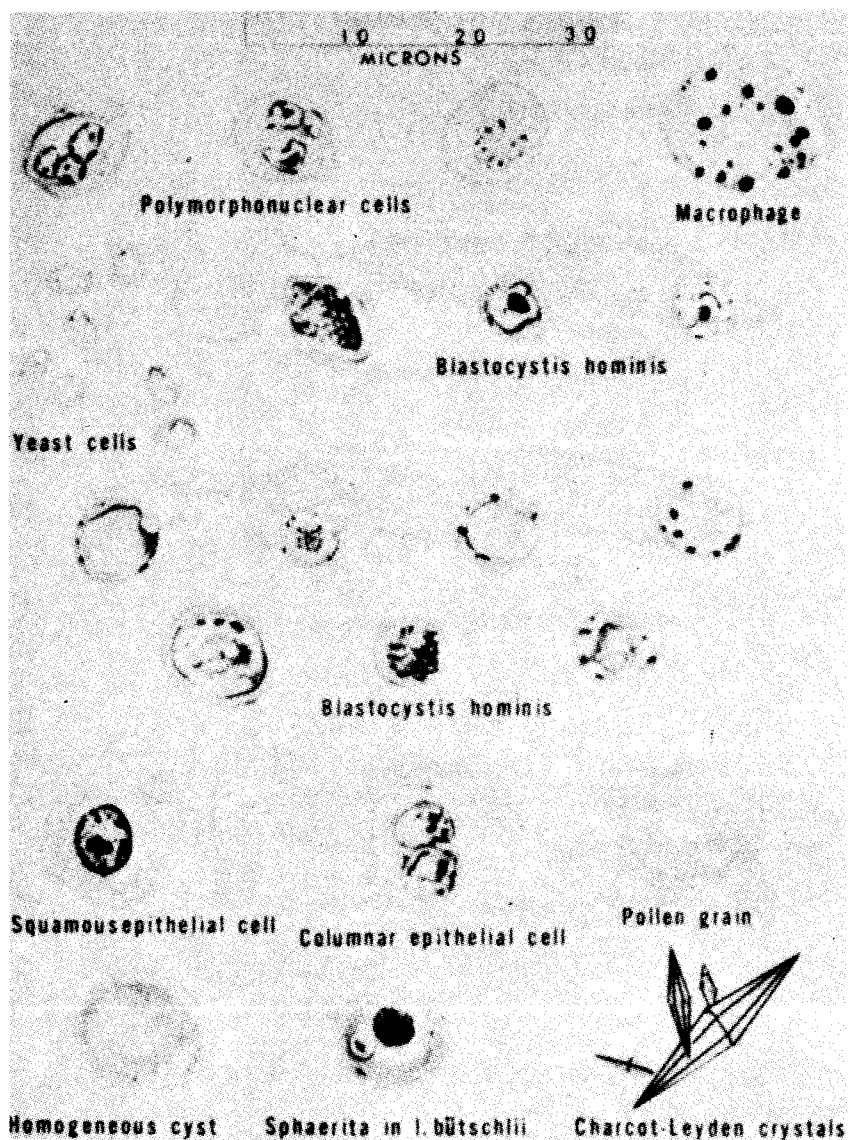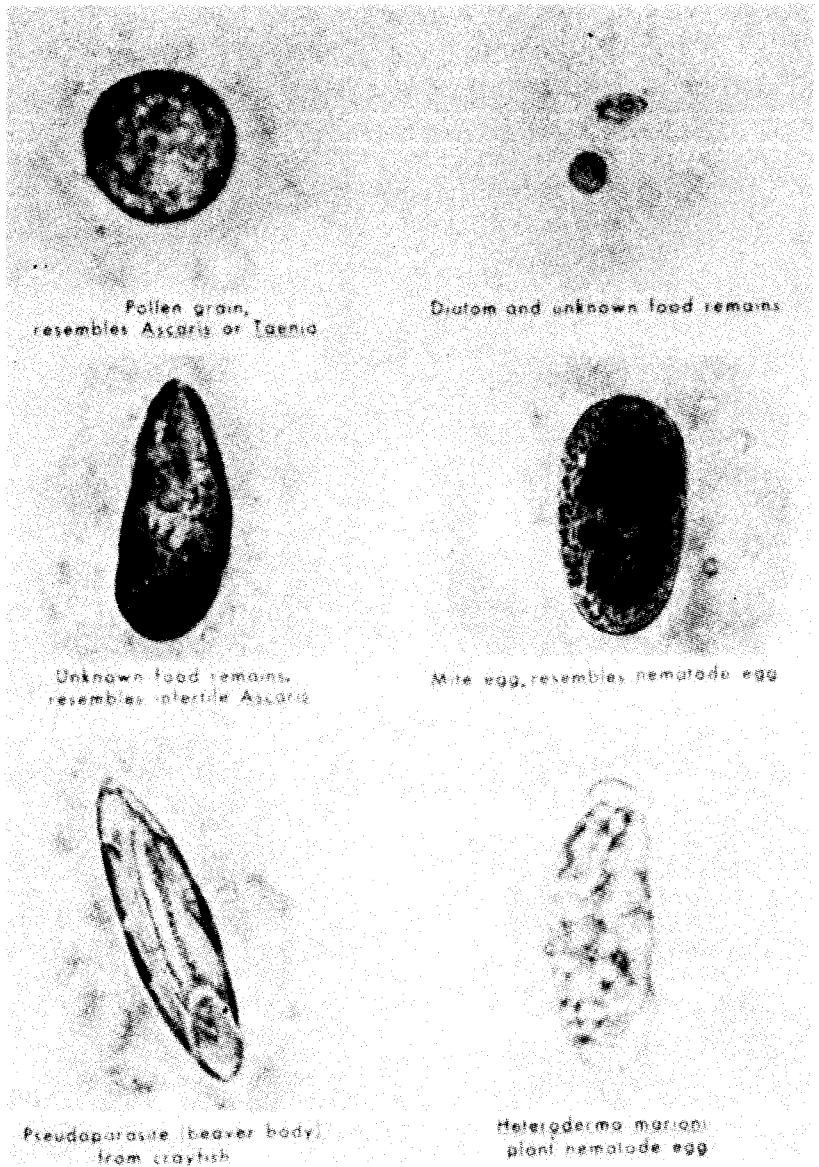
Figure 16. Objects in feces resembling the eggs of the helminths that parasitize humans.

Food remains, resembles
Ascaris and Taenia

Vegetable cell, resembles helminth egg

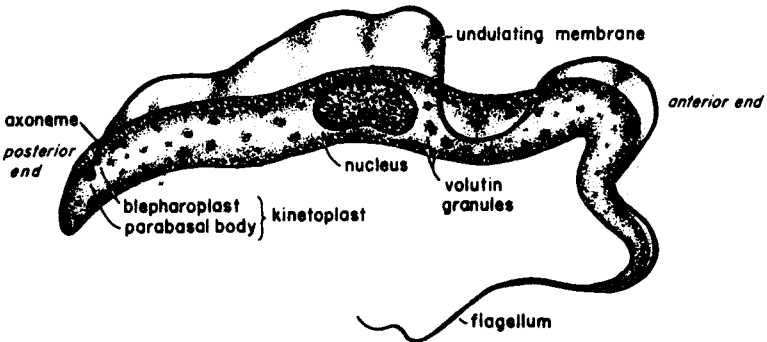Pollen grain (pine)

Vegetable cell, resembles helminth egg

Vegetable hair,
resembles nematode larva

Food remains,
lacks definite internal structure

Pollen grain without internal structure

Food remains, resemble helminth egg
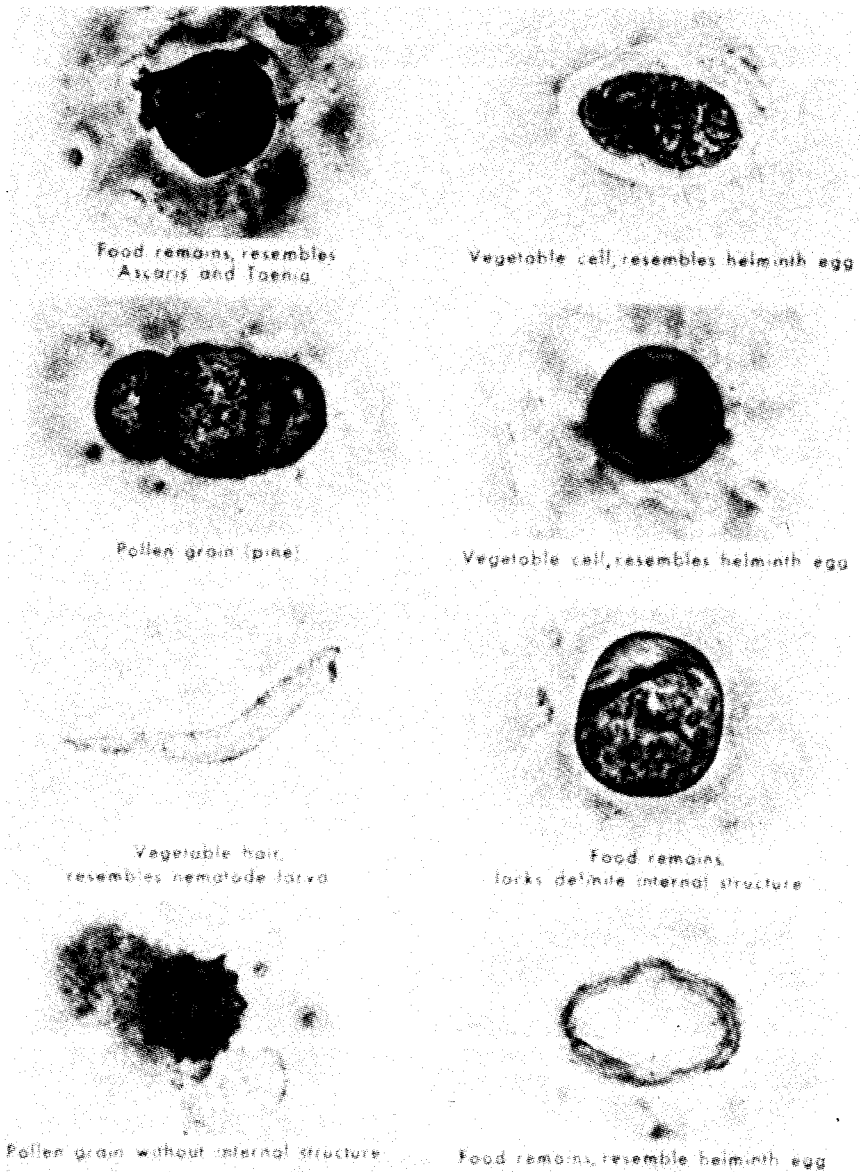
Figure 17. Objects in feces resembling the
eggs of the helminths that parasitize
humans.

F- Ring stage trophozoite.
G- Older ameboid trophozoite
in process of development.
H- Mature trophzoite.
I- Mature trophzoite with chromatin in
process of division.
J- Young schizont showing early division
of chromatin.
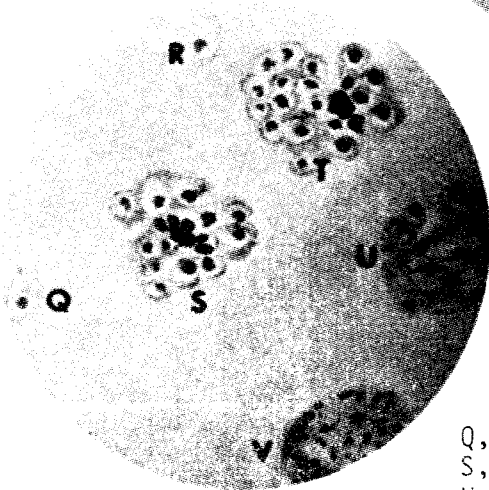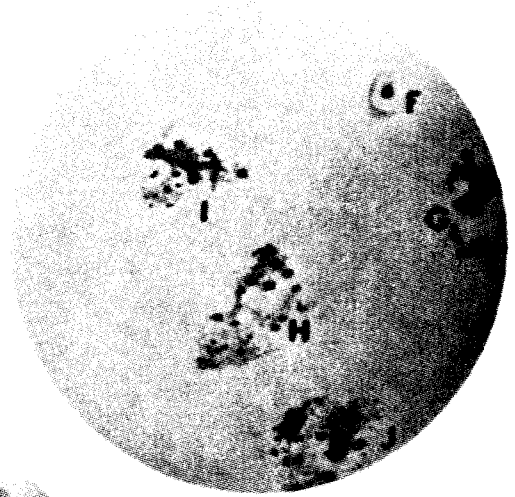


Q,R- Young rings.
S,T- Mature schizonts
U- Mature microgametocytes
V- Mature macrogametocytes

Figure 18. Plasmodium vivax.
Giemsa's stain.

A,B,C, - Single nucleus ring forms
D,E - Double nucleus ring forms
F,G,H - Platelets
I- White blood cell
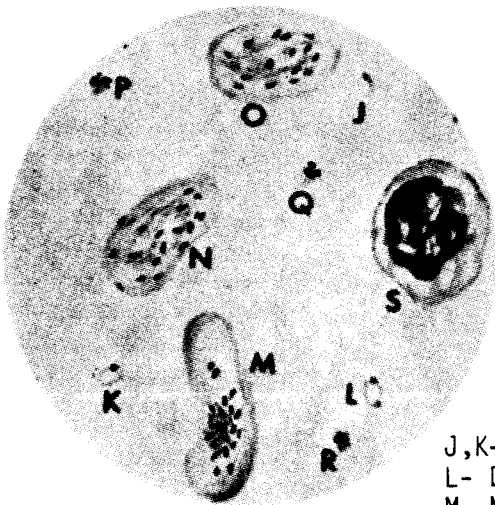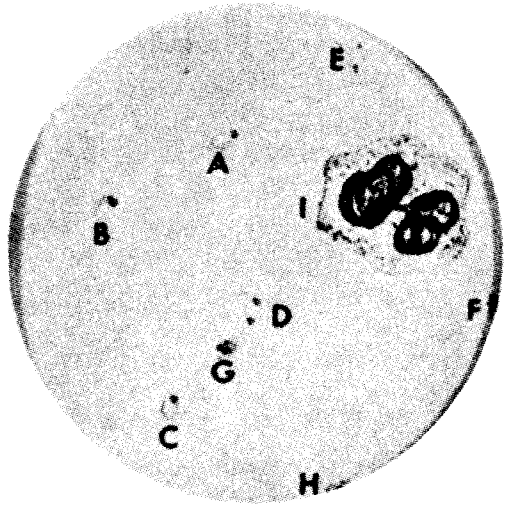


J,K- Single nucleus ring form
L- Double nucleus ring form
M- Mature macrogametocyte

Figure 19. Plasmodium falciparum.
Giemsa's Stain.

A,B,C- Ring forms
D,E- Developing trophozoites
F- First stage schizont
G,H,I- Blood platelets
J- White blood cells
K,L,M,N- Ring forms
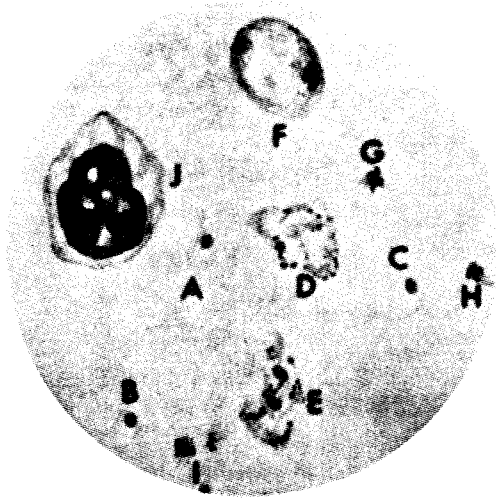
O,P,- Platelets
Q-   Immature schizont
R-   Mature schizont
S-   Mature macrogametocyte
T-   Mature microgametocyte
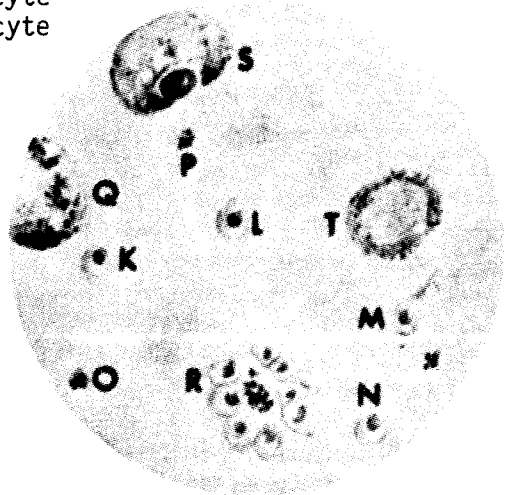


Figure 20. Plasmodium malariae.
Giemsa's stain.

A- Young ring-shaped trophozoites
B,C,D- Older ring-shaped trophozoites
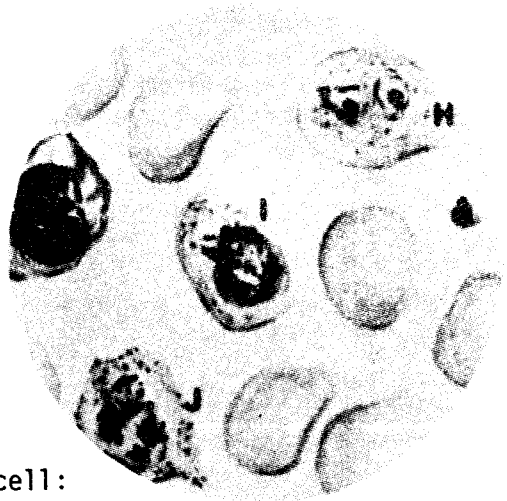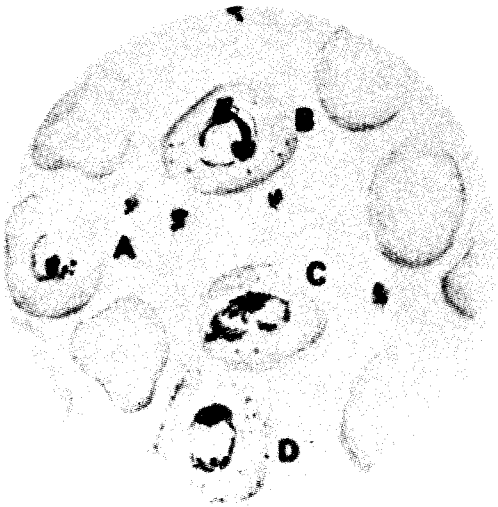


H- Doubly infected cell:
   trophozoites
I- Developing schizont
J- First stage of the schizont

Figure 21. Plasmodium ovale. Giemsa's stain.
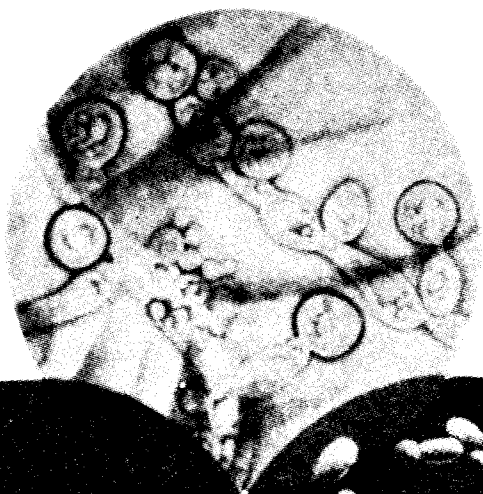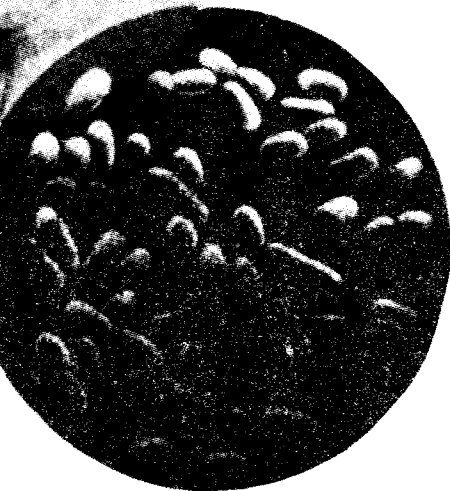
A-Candida albicans mycelia
B-Trichomonas vaginalis
C-Clue Cells,Hemophilus vaginalis

Figure 22. Causative agents of vaginitis.

APPENDIX C

LABORATORY PROCEDURES

C-1. NORMAL VALUES FOR URINE.

Color: Straw - yellow - amber.

Appearance: Clear - hazy - cloudy.

Reaction (pH): 4.6 - 8.

Specific gravity: 1.003-1.030 (for 24-hr specimen, specific gravity will range 1.015-1.025).

If there is a delay in analysis, add 4 drops of formalin to 100 cc. of urine to preserve specimen. Do not use if sugar concentration is to be determined. To obtain specific gravity when an insufficient amount of urine is present to float the weighted meter:

a. Dilute with distilled water and measure specific gravity of dilute mixture.

b. Multiply the numbers after decimal point by total volume of urine and water.

c. Divide by volume of urine diluted.

d. Add 1.

Example: 20 cc. of urine is diluted with 30 cc. of distilled water.

The specific gravity of this diluted mixture is 1.006; therefore, the undiluted urine is $\dfrac{.006 \times 50}{20} + 1 = 1.015$

C-2. STAINING TECHNIQUES.

a. Gram's stain.

(1) Dry thoroughly (air dry).

(2) Heat fix.

NOTE: Specimen is fixed to slide and may be stained at a later time without deterioration.

(3) Crystal violet (1 min).

(4) Wash with water.

(5) Gram's iodine (1 min).

(6) Wash with water.

(7) Spray with decolorizer (3-5 sec).

(8) Wash with water.

(9)  Safranin (30 sec).

(10)  Wash with water.

(11)  Air dry.

b.  Wright's stain.

(1)  Air dry slide.

(2)  Wright's stain (2 min).

(3)  Add D/water (buffer) (4 min).

(4)  Wash with water.

(5)  Air dry.

NOTE:  The times recommended for staining and buffering are approximate and should be adjusted with each fresh batch of stain.

C-3.  DIRECT WET SMEAR.  In the microscopic examination of fecal specimens for ova and parasites, the most simplified method is the direct wet smear method.

a.  Materials needed:

(1)  Medicine dropper.

(2)  Physiological saline.

(3)  Coverslips.

(4)  Slides.

(5)  Applicator sticks.

b.  Technique:

(1)  Place 1 drop of saline in center of slide.

(2)  Select a small portion of feces and mix on slide with the 1 drop of saline that has been previously placed there.

(3)  Add cover slip to the mixture and examine first using low power, then switch to high power for better observation of suspicious objects.

Adding a drop of Lugol's solution to a small portion of feces may be used as a rapid screening technique.

C-4.  FORMALIN ETHER SEDIMENTATION METHOD.  This method is excellent for recovery of cysts and helminth eggs.

a.  Materials and equipment:

(1)  Physiologic saline.
(2)  Gauze.

(3)  Formalin (10%).
(4)  Ether.
(5)  Applicator sticks.
(6)  Slides.
(7)  Beaker or specimen container.
(8)  Funnel.
(9)  Pointed centrifuge tubes.
(10) Stopper for centrifuge tubes.
(11) Coverslips.
(12) Iodine solution.

b.  Technique:

(1)  Take small portion of feces and mix in 10-12 cc. of saline in a beaker.

(2)  Pass mixture through two layers of wet gauze, using funnel, into a pointed centrifuge tube.

(3)  Centrifuge for 2 min at 1,500-2,000 rpm.

(4)  Pour off supernate and resuspend sediment in fresh saline.

(5)  Centrifuge again at 1,500-2,000 rpm for 2 min.

(6)  Pour off supernate, resuspend sediment in fresh saline.

(7)  Centrifuge again 1,500-2,000 rpm for 2 min.

(8)  Pour off supernate.

(9)  Repeat steps 6 and 7 until supernate is relatively clear.

(10) Add 10 cc. of 10% formalin to sediment.

(11) Mix thoroughly (1 min).

(12) Let stand for at least 10 min.

(13) Add 3 cc. of ether.

(14) Stopper the tube.

(15) Shake vigorously until thoroughly mixed (1 min).

(16) Centrifuge at 1,500 rpm for 2 min.

(Four layers should result in tube: A small amount of sediment containing most of the protozoan cysts and ova, a layer of formalin, a plug of detritus just on top of the formalin, and a topmost layer of ether.)

(17) With applicator stick ream centrifuge tube to loosen fecal plug and pour off supernate.

(18) Quickly decant (pour off) the top three layers leaving the sediment undisturbed.

(19) Swab inside of centrifuge tube to clean all residue to

C-3

prevent contaminating sediment when pouring.

(20) Using applicator stick, mix remaining sediment in the tube with fluid that will drain back from the sides.

(21) Place drop on slide, add a drop of iodine, mix thoroughly, add coverslip, and examine using low power.

(22) Switch to high power to confirm findings.

All fecal specimens should be put in MIF solution prior to examinations. This will save space, cut down on stench, and preserve specimen (walnut size portion of specimen is all that is needed for lab findings).

Taking portions of specimen plus 3 times portion of MIF is the proper way to store or send specimen from field.

Formula for MIF: Lugol's solution - 10 parts, formaldehyde - 12.5 parts, tincture merthiolate - 77.5 parts.

Formula for Lugol's solution: Iodine (powdered crystals) 5 gm, potassium iodine (KI) 10 gm, distilled water 100 cc.; mix thoroughly and filter. This solution will remain satisfactory for months.

C-5. "DIXIE CUP" TECHNIQUE.

a. This technique is a variation of the formalin ether sedimentation method. It is faster, materials are a little cheaper, and it is thought to cause less damage to the ova, making them easier to recognize under the microscope. The technique is especially good for making a diagnosis in a low density infestation.

b. Technique:

(1) Add 50 ml. of MIF solution to about 25 ml. of feces.

(2) Stir and filter through two layers of gauze into a small paper cup (Dixie cup).

(3) Let it stand for 5 min and pour off the top layers of fluid, leaving about 10 ml. of material in the cup.

(4) Pour this 10 ml. of material into a test tube and add 3 to 5 ml. of ether.

(5) Centrifuge for 2 min at 1,500 rpm.

(6) Pour off the top layers of fluid (supernatant). Put a drop of the residue on a slide for microscopic examination.

C-6. TUBES ("VACUTAINERS"). Tubes to be used if sending specimens to hospital lab and if the following tubes are available:

a. Gray stopper tube.

(1) Sugar.

(2) Bun.

(3)  NPN.

(4)  Ammonia.

(5)  Iron.

b.  Purple stopper tube.

   (1)  Hematology (W.B.C., etc.).

   (2)  Alcohol.

   (3)  Carbon dioxide.

   (4)  Carbon monoxide.

   (5)  Oxygen.

c.  Red stopper.

   All procedures requiring clotted blood.

C-7.  STOOL GUAIAC FOR OCCULT BLOOD.

a.  Reagents:

   (1)  Hydrogen peroxide (3%).

   (2)  Glacial acetic acid.

   (3)  Saturated solution of gum guaiac in 95% ethyl alcohol.

b.  Procedure:

   (1)  Smear small bit of feces on filter paper.

   (2)  Add:

      (a)  1 drop guaiac solution .

      (b)  1 drop glacial acetic acid.

      (c)  1 drop hydrogen peroxide.

c.  Interpretation of results:

   (1)  Positive reaction is when a blue or dark green color appears
in 30 sec.

   (2)  Other colors or delayed reaction are regarded as negative.

CELLULAR COMPONENTS OF BLOOD, NORMAL VALUES,

AND SIGNIFICANCE OF BLOOD TEST


D-1.  ERYTHROCYTES (RED BLOOD CELLS).

     a.   Erythrocytes comprise the majority of all blood cells; they are
chiefly responsible for the color of blood.  There are approximately 5
million erythrocytes in 1 cubic mm. of blood.

     b.   Normal red cell is a biconcave disk; red cell in normal blood has
no nucleus.

     c.   Their principal function is to transport oxygen (accomplished by
iron-containing hemoglobin).  There are 15 grams of hemoglobin per 100 ml.
of blood.

     d.   Red blood cells are produced in red bone marrow, which also
provides most of the blood's leukocytes and all its platelets.  Red cells
of normal adults are found in short and flat bones--ribs, sternum, skull,
vertebrae, bones of the hands and feet.

     e.   Bone marrow requires a number of nutrients, including iron,
vitamin $B_{12}$, folic acid, and pyridoxine for normal erythropoiesis
(formation of red cells).

     g.   Normal life expectancy of a red cell is between 115 and 130 days.
It is then eliminated by phagocytosis in the reticuloendothelial system,
predominately in the spleen and liver.

D-2.  LEUKOCYTES (WHITE BLOOD CELLS).

     a.   Leukocytes normally are present in a concentration of between
5,000 and 10,000 cells in each cubic millimeter of blood (1 white cell for
every 500-1,000 red cells).

     b.   Leukocytes have a nucleus and are capable of active movement.

     c.   Major categories of leukocytes include the granulocytic series,
lymphocytes, monocytes, and plasma cells.

     d.   Leukocytosis--white cell count over 10,000.

     e.   Leukopenia--white cell count below 5,000.

     f.   Granulocytes--leukocytes produced in the marrow.

          (1)  Comprise 70% of all white cells.

          (2)  Called granulocytes because of the abundant granules
contained in their cytoplasm, or polymorphonuclear leukocytes since their
nuclei, when mature, are of a highly irregular, multilobed configuration.

     g.   Lymphocytes--a variety of leukocyte that arises in the thymus

gland and lymph nodes; generally described as nongranular and including small and large varieties.

   (1)  Responsible for the immunologic competence of an individual.

   (2)  Comprise about 25 percent of the circulating white cells.

   h.  Monocytes--derived from components of the reticuloendothelial system (particularly spleen, liver, and lymph nodes).

   (1)  Constitute a ready source of mobile phagocytes, congregating and performing their scavenging function at sites of inflammation and tissue necrosis.

   (2)  Account for about 5 percent of the white cell count.

   i.  Plasmocytes--formed in the lymph nodes and bone marrow.

   (1)  Are the main and probably sole source of the circulating immune globulins.

   (2)  Represent approximately 1 percent of the blood leukocytes.

D-3.  PLATELETS (THROMBOCYTES).

   a.  Platelets are the smallest and most fragile of the formed elements; they are small particles (devoid of nuclei) that arise as a result of a fragmentation from giant cells called megakaryocytes in the bone marrow.

   b.  There are approximately 250,000-500,000 platelets per cubic millimeter of blood.

   c.  Their prime function is to halt bleeding--accomplished by congregating and clumping at all sites of vascular injury and by plugging with their own substance the lumen of the blood vessels.  As they disintegrate they release a constituent (platelet factor 3) that initiates clot formation in their immediate vicinity, thereby checking the flow of blood through the leakage of blood from the lacerated vessel.

   d.  They cause blood clots to shrink (retract), the effect of which is to draw together the margins of vascular defects, reduce their size, and further stem the leakage.

D-4.  HEMATOLOGY NORMAL VALUES.

   a.  Hematocrit--Men:  39-54%; Women:  36-47%.

   b.  Hemoglobin--Children:  12-14 gm%; Newborn:  14.5-24.5 gm%.

   c.  If one counted 100 W.B.C. randomly on a blood smear, the white blood cells present in normal blood, the breakdown would be as follows: Total W.B.C. = 4,500-10,000.
   (1)  Segmented neutrophils              45-75%
   (2)  Immature band neutrophils          0- 7%
   (3)  Lymphocytes                        15-35%
   (4)  Eosinophils                        0- 7%
   (5)  Basophils                          0- 1%

(6)  Monocytes                                    0-12%

d.  Normal platelet counts are usually in the range of
180,000-400,000.  A "shift to the left" is a term for an increase over
normal in the number of immature or "band" neutrophils.  This is usually
seen in the early part of an infection.  A "shift to the right" refers to
preponderance of mature (segmented) neutrophils as seen in the later stages
of an infection.

D-5.  CAUSES OF EOSINOPHILIA (7% or more).

a.  Allergic states:  Hay fever, asthma, exfoliative dermatitis,
erythema multiforme, and drug reactions.

b.  Parasitic diseases:  Intestinal forms (hookworm, roundworm) and
tissue forms (Toxocara, Trichina, Strongyloides, Echinococcus).

c.  Skin disorders:  Pemphigus and dermatitis herpetiformis.

d.  Neoplasms:  Myeloproliferative disorders, Hodgkin's disease, and
metastatic carcinoma.

e.  Other disorders:  Scarlet fever, polyarteritis, eosinophilic
granuloma, tropical eosinophilia, and pernicious anemia.

D-6.  CAUSES OF NEUTROPHILIA (W.B.C. 10,000 or more).

a.  Infection:  Due to bacteria (especially pyogenic), mycobacteria,
fungi, spirochetes, and parasites.  May be localized or generalized.

b.  Metabolic disorders:  Due to diverse causes resulting in uremia,
diabetes, acidosis, gout, and eclampsia.

c. ‑ Neoplasms:  Usually widely disseminated myeloproliferative
disorders, lymphoma, and metastatic carcinoma.

D-7.  CAUSES OF NEUTROPENIA (W.B.C. 5,000 or below).

a.  Infections:  Acute viral (rubeola, hepatitis), rickettsial,
bacterial (typhoid, brucella), or protozoan (malaria).  All grave
infections (bacteremia, miliary tuberculosis).

b.  Marrow aplasia:  Due to chemical or physical agents that
regularly produce aplasia (e.g., benzol, radiation) and other rarer causes
(drugs).

c.  Nutritional deficits:  Folic acid and vitamin $B_{12}$.

d.  Splenomegaly:  Due to diverse causes (e.g., congestive,
infiltrative).

e.  Other disorders:  Systemic lupus erythematosus, anaphylaxis,
antileukocyte antibodies, immunodeficiencies, pancreatic exocrine
deficiency, and cyclic neutropenia (familial and sporadic).

D-8.  CAUSES OF LYMPHOCYTOSIS (Lymphocyte count >35%).

a.  Acute infection:  Infectious mononucleosis, infectious

lymphocytosis, pertussis, mumps, rubella, infectious hepatitis, and the convalescent stage of many acute infections.

   b.   Chronic infections: Tuberculosis, syphilis, and brucellosis.

   c.   Metabolic disorders: Thyrotoxicosis and adrenal cortical insufficiency.

   d.   Neoplasms:  Chronic lymphatic leukemia, lymphosarcoma.

D-9.  CAUSES OF MONOCYTOSIS.

   a.   Bacterial infections:  Brucellosis, tuberculosis, subacute bacterial endocarditis, and, rarely, typhoid fever.

   b.   Rickettsial infections:  Rocky mountain spotted fever, typhus.

   c.   Protozoan infections:  Malaria.

   d.   Neoplasms: Monocytic leukemia, Hodgkin's disease and other lymphomas, myeloproliferative disorders, multiple myeloma, and carcinomatosis.

   e.   Connective tissue disease:  Rheumatoid arthritis and systemic lupus erythematosus.

   f.   Other disorders:  Chronic ulcerative colitis, regional enteritis, sarcoidosis, lipid-storage diseases, hemolytic anemia, hypochromic anemia, and recovery from agranulocytosis.

D-10.  CAUSES OF BONE MARROW PLASMACYTOSIS.

   a.   Acute infections:  Rubella, rubeola, varicella, infectious hepatitis, infectious mononucleosis, and scarlet fever.

   b.   Chronic infections:  Tuberculosis, syphilis, and fungus.

   c.   Allergic states:  Serum sickness and drug reactions.

   d.   Collagen-vascular disorders:  Acute rheumatic fever, rheumatoid arthritis, and systemic lupus erythematosus.

   e.   Neoplasms:  Disseminated carcinoma, Hodgkin's disease, and multiple myeloma.

   f.   Other:  Cirrhosis of the liver.

APPENDIX E

HISTORY AND PHYSICAL EXAMINATION GUIDE

E-1. OUTLINE OF MEDICAL HISTORY.

a. Identifying data: Name, rank, service number, unit, birthdate, sex, occupation, race, religion, marital status.

b. Chief complaint: Concise statement of primary reason the patient seeks help.

c. Present illness: State of health prior to onset of illness, nature and circumstances of onset, location and nature of pain or discomfort, progression, treatment received and its effect.

d. Past history:

(1) Childhood diseases.

(2) Previous illnesses and injuries.

(3) Previous hospitalization and surgery.

(4) Review of systems.

e. Family history: History of diabetes, hypertension, tuberculosis, etc.

f. Social history: Marital status, occupational data, and habits (tobacco, alcohol, drugs).

E-2. OUTLINE OF PHYSICAL EXAMINATION.

a. Vital signs: Height, weight, blood pressure, pulse, respirations, temperature.

b. General: Posture, emotional state, state of consciousness, acuteness or severity of illness.

c. Integument: Skin, hair, nails.

d. Eyes: Lids, sclera, cornea, conjunctiva, pupil, lens, fundus, ocular mobility, visual acuity.

e. Ears: External ear, canals, tympanic membranes, acuity.

f. Nose: External nose, septum, turbinates, patency.

g. Mouth: Lips, teeth, gingivae, tongue, tonsils, throat, palate, floor of mouth.

h. Neck: Trachea, thyroid, pulses, lymph nodes.

i. Lungs: Chest shape, symmetry, expansion, percussion and auscultation.

j. Heart: Pulse, B.P., color, peripheral perfusion, palpation,

percussion and auscultation.

    k.  Breasts:  Symmetry, masses, tenderness.

    l.  Abdomen:  Inspection, palpation, percussion, auscultation for liver, spleen, kidneys, bladder, hernia, lymph nodes, masses, tenderness, muscle tone, bowel sounds.

    m.  Genitalia:  Penis and testes.

    n.  Rectum and prostate.

    o.  Extremities:  Strength, range of motion, pulses.

    p.  Back:  Curvature, mobility.

    q.  Neurological:  Cranial nerves, sensory system, motor system, reflexes, mental status, meningeal signs.

APPPENDIX F

FIELD STERILIZATION AND DISINFECTION

1. GENERAL.

    a.  An article is sterile or not sterile.  There is no in-between.
If any doubt exists, it is not.

    b.  All materials to be sterilized must be clean, free from oil, and
in good working condition.

    c.  Wrappers for sterile goods must be double thickness and free from
holes.

    d.  Label packs when packed.

    e.  Packs should be packaged loosely but securely.

    f.  Packs are dated when removed from sterilizer and are outdated in
4 weeks (2 weeks if humidity is high).

    g.  Articles being disinfected by boiling or with chemical solution
must be covered by solution and the solution covered.

2. METHODS OF STERILIZATION AND DISINFECTION.

    a.  Steam under pressure (autoclave).

        (1)  Method of choice.

        (2)  Any commercial pressure cooker can be used if an autoclave
is not available.

        (3)  Kills all organisms including spores.

        (4)  Must reach a minimum of 15 psi and 250$^{\circ}$F. (121$^{\circ}$C.) for 15
minutes for sterilization.  NOTE:  If using pressure cooker, maintain
approximately 17 psi on gage.  This will assure 250$^{\circ}$F. minimum temperature.

        (5)  Allow 30 minutes for instrument packs and linen + 15 minutes
for drying, 15 minutes for rubber goods + 15 minutes for drying.

        (6)  Maximum size for all packs is 12 x 18 inches.

        (7)  Always use autoclave tape and Diack control if available.

    b.  Dry heat.

        (1)  Can be done in an oven.

        (2)  Used for ointments, oils, waxes and powders; may also be
used for glassware, instruments, needles, and dry goods.  It is destructive
to fabrics.

        (3)  Time:  For oils, ointments, waxes, and powders 120 minutes
at 320$^{\circ}$F.; for glassware, instruments, needles, and dry goods:  60 minutes
at 320$^{\circ}$F.

F-1

c.  Flame (incineration).

(1)  Used for materials that can be burned (food, paper, dressings, etc.).

(2)  Time:  Until completely destroyed.

d.  Sunlight.

(1)  Use for clothing, bedding, and mattresses.

(2)  Time: 6 hours or more in direct sunlight on each side.

e.  Chemicals.

(1)  Zephiran chloride.

(a)  Make 1:750 solution.

(b)  Time:  18 hours minimum.

(c)  Does not kill spores or tubercle bacilli.

(2)  Alcohol.

(a)  Make 70% solution.

(b)  Time:  18 hours minimum.

(c)  Does not kill spores.

(d)  Will maintain sterility after sterilization by other methods.

(e)  Add 0.5% sodium nitrite to prevent rust of instruments.

(3)  Formaldehyde-alcohol solution.

(a)  Most active germicidal agent available and will kill spores.

(b)  RX.

Ethyl or isopropyl alcohol 99%          700 ml.

Formaldehyde solution U.S.P. 37%         25 ml.

Sodium nitrite                          1.0 gm

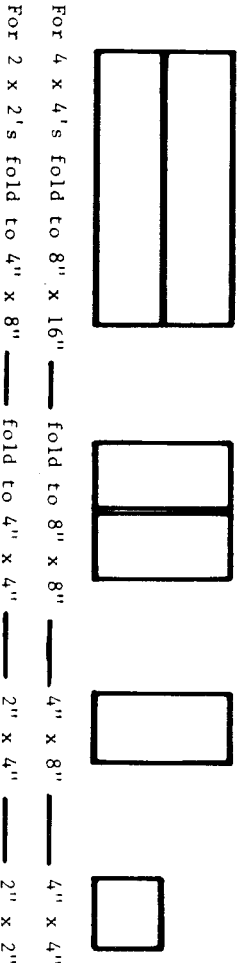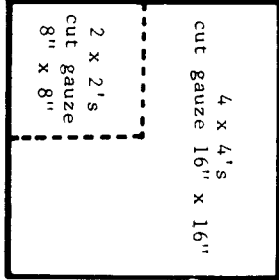Sodium bicarbonate                      1.0 gm

Distilled water Q.S.ad               1,000 ml.

(c)  Time:  Metal instruments, 3 hours; catheters, 18-24 hours.
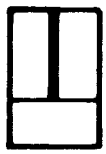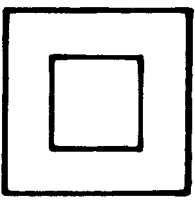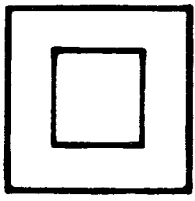
f.  Boiling.

(1) Start timing after water comes to boil.

(2) Add 5 minutes time for each 1,000 ft elevation above sea level.

(3) Do not boil blades, scissors, etc., except in emergency (rusts edges).

(4) Addition of sodium carbonate to make a 2% solution will increase effectiveness.

(5) Boil for 30 minutes at sea level.

(6) <u>Boiling does not kill spores</u>.

# PREPARATION OF SURGICAL SUPPLIES

## TO MAKE GAUZE FOLDED

cut gauze 16" x 16"

4 x 4's

2 x 2's
cut gauze
8" x 8"

Gauze 16" x 16"
Cellucotton 8" x 8"

For 4 x 4's fold to 8" x 16" ——— fold to 8" x 8" ——— 4" x 8" ——— 4" x 4"

For 2 x 2's fold to 4" x 8" ——— fold to 4" x 4" ——— 2" x 4" ——— 2" x 2"

## TO MAKE ABDOMINAL PADS

Turn in narrow edge of gauze along left side

Fold upper and lower gauze flaps to center of cotton
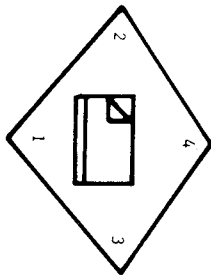
Fold right side of gauze to center of cotton

Fold left side of gauze to center of cotton

Fold pad in half smooth side inside

## TO WRAP DRY GOODS

Place article to be wrapped on a double muslin or heavy paper
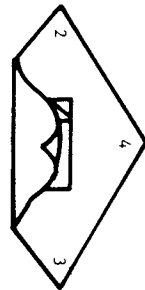
Bring corner (1) up over article; fold back flap
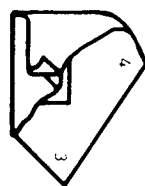
Bring corner (2) up over article; fold back flap
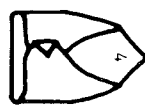
Bring corner (3) up over article; fold back flap

Bring corner (4) up over article; fold under (2) and (3)

# PREPARATION OF SURGICAL SUPPLIES(CONT'D)

## TO MAKE COTTON APPLICATORS

Place several applicator sticks in a small container of water.
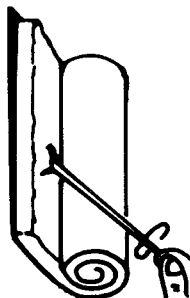
Take applicator stick. Pick up small amount of cotton rotating stick.

Smooth cotton over end of stick; be sure tip is covered.

Wind cotton around stick.

# PREPARATION OF SURGICAL SUPPLIES(CONT'D)

## TO MAKE COTTON BALLS

Take circular piece of cotton

Place piece of cotton in circle formed by index finger and thumb; press in center of cotton.

Moisten tips of index and middle finger, twist top of cotton together between fingers.

## DRUG OF CHOICE CHART

| Infecting Organism | Drug of First Choice | Alternative Drugs |
|---|---|---|
| I.   AEROBIC BACTERIA |  |  |
|    A.   Gram-positive cocci |  |  |
|       1.   Staphylococci |  |  |
|          a.   Nonpenicillinase-producing | Penicillin | Cephalothin, vancomycin, erythromycin, lincomycin. |
|          b.   Penicillinase-producing | Penicillinase-resistant penicillin (e.g., methicillin, oxacillin) | Cephalothin, vancomycin, erythromycin, gentamicin, lincomycin. |
|       2.   Streptococci |  |  |
|          a.   Pyogenic groups A, B, C | Penicillin | Erythromycin, cephalothin, ampicillin. |
|          b.   Viridans | Penicillin with or without streptomycin | Ampicillin, vancomycin with or without streptomycin, cephalothin, erythromycin. |
|          c.   Enterococci (group D) | Penicillin G with or without streptomycin | Ampicillin, chloramphenicol, tetracycline. |
|       3.   Pneumococcus (streptococcus pneumoniae) | Penicillin | Erythromycin, cephalothin. |
|    B.   Gram-negative cocci |  |  |
|       1.   Neisseria catarrhalis | Penicillin | Tetracycline. |
|       2.   Neisseria gonorrhoeae | Penicillin | Tetracycline, ampicillin, spectinomycin. |
|    C.   Gram-negative bacilli |  |  |
|       1.   Escherichia coli | Ampicillin, cephalothin | Kanamycin, tetracycline, gentamicin, chloramphenicol. |
|       2.   Aerobacter (Enterobacter) aerogenes | Kanamycin | Tetracycline with or without streptomycin, gentamicin. |
|       3.   Klebsiella species | Cephalothin | Kanamycin, polymyxin, chloramphenicol. |
|       4.   Pseudomonas aeruginosa | Gentamicin | Colistin, polymyxin, carbenicillin. |
|       5.   Proteus |  |  |
|          a.   P. mirabilis | Ampicillin | Kanamycin, cephalothin, gentamicin. |
|          b.   Other Proteus | Kanamycin | Nalidixic acid, cephalothin, carbenicillin, gentamicin. |

| Infecting Organism | Drug of First Choice | Alternative Drugs |
|---|---|---|
| 6. Serratia species | Gentamicin | Kanamycin, chloramphenicol. |
| 7. Alcaligenes faecalis | Chloramphenicol or tetracycline | Penicillin G. |
| 8. Salmonella typhi | Chloramphenicol | Ampicillin, cephalothin. |
| 9. Hemophilus species | | |
| a. H. influenzae | Ampicillin | Tetracycline, cephalothin. |
| b. H. ducreyi | Tetracycline | Sulfonamides, streptomycin. |
| 10. Brucella species | Tetracycline | Chloramphenicol. |
| 11. Pasteurella species | | |
| a. P. tularensis | Streptomycin | Tetracycline. |
| b. P. pestis | Tetracycline | Streptomycin. |
| D. Gram-positive bacteria | | |
| 1. Bacillus anthracis | Penicillin | Erythromycin, tetracycline. |
| 2. Corynebacterium species | Erythromycin | Penicillin. |
| 3. Diphtheroid species | Penicillin | Ampicillin, erythromycin. |
| 4. Mycobacterium tuberculosis | Isoniazid with or without streptomycin, with or without para-aminosalicylic acid or ethambutol. | Pyrazinamide, cycloserine, ethionamide, viomycin, kanamycin, capreomycin, erythromycin. |
| 5. Listeria monocytogenes | Erythromycin | Penicillin. |
| II. MICROAEROPHILIC BACTERIA | | |
| A. Gram-positive cocci | | |
| 1. Streptococci | | |
| a. Hemolytic | Penicillin G | Ampicillin, tetracycline, chloramphenicol. |
| b. Nonhemolytic | Penicillin G | Ampicillin, tetracycline, chloramphenicol. |
| III. ANAEROBIC BACTERIA | | |
| A. Gram-positive cocci | | |
| 1. Streptococcus species | Penicillin G | Ampicillin, tetracycline, chloramphenicol. |
| B. Gram-positive bacilli | | |
| 1. Clostridium species | | |
| a. C. perfringens | Penicillin G and tetracycline | Cephalothin, erythromycin. |
| b. C. novyi | Penicillin G | Tetracycline, cephalothin. |
| c. C. histolyticum | Penicillin G | Tetracycline, cephalothin. |
| d. C. septicum | Penicillin G | Tetracycline, cephalothin. |

| Infecting Organism | Drug of First Choice | Alternative Drugs |
|---|---|---|
|     e.  C. sordellii | Penicillin G | Tetracycline, cephalothin. |
|     f.  C. sporogenes | Penicillin G | Cephalothin, tetracycline. |
|     g.  C. tetani | Penicillin G | Cephalothin, tetracycline. |
|   C.  Bacteroides species | Tetracycline with sulfadiazine | Chloramphenicol, Vibramycin. |
| IV.  MISCELLANEOUS | | |
|   A.  Actinomyces bovis | Penicillin G | Sulfadiazine. |
|   B.  Nocardia species | Sulfadiazine | Penicillin G. |
|   C.  Fusobacterium fusiforme | Penicillin | Tetracycline, erythromycin. |
|   D.  Calymmatobacterium granulomatis | Tetracycline | Streptomycin. |
| V.  ACID FAST BACILLI | | |
|   A.  Mycobacterium tuberculosis | Isoniazid with rifampin | Ethambutol; streptomycin; para-aminosalicylic acid (PAS); pyrazinamide; cycloserine; ethionamide; kanamycin; capreomycin. |
|   B.  Mycobacterium kansasii | Isoniazid with rifampin, with or without ethambutol | Streptomycin; an erythromycin; ethionamide; cycloserine; amikacin. |
|   C.  Mycobacterium aviumintracellulare complex | Isoniazid, rifampin, ethambutol, and streptomycin | Amikacin; ethionamide; cycloserine. |
|   D.  Mycobacterium fortuitum | Amikacin | Rifampin; doxycycline. |
|   E.  Mycobacterium marinum (balnei) | Minocycline | Rifampin. |
|   F.  Mycobacterium leprae (leprosy) | Dapsone with or without rifampin | Acedapsone; rifampin; clofazimine. |
| VI.  ACTINOMYCETES | | |
|   A.  Actinomyces israelii (actinomycosis) | Penicillin G | A tetracycline. |
|   B.  Nocardia | Trisulfapyrimidines | Trimethoprim-sulfamethoxazole; trisulfapyrimidines with minocycline or ampicillin or erythromycin; cycloserine. |
| VII.  CHLAMYDIA | | |
|   A.  Chlamydia psittaci (psittacosis; ornithosis) | A tetracycline | Chloramphenicol. |

| Infecting Organism | Drug of First Choice | Alternative Drugs |
|---|---|---|
| B. Chlamydia trachomatis | | |
| 1. (Trachoma) | A tetracycline (topical plus oral) | A sulfonamide (topical plus oral). |
| 2. (Inclusion conjunctivitis) | An erythromycin | A tetracycline; a sulfonamide. |
| 3. (Pneumonia) | An erythromycin | A sulfonamide. |
| 4. (Urethritis) | A tetracycline | An erythromycin. |
| C. Lymphogranuloma venereum | A tetracycline | An erythromycin; a sulfonamide. |
| VIII. FUNGI | | |
| A. Aspergillus | Amphotericin B | No dependable alternative. |
| B. Blastomyces dermatitidis | Amphotericin B | Hydroxystilbamidine. |
| C. Candida species | Amphotericin B with or without flucytosine | Nystatin (oral or topical); miconazole; clotrimazone (topical). |
| D. Chromomycosis | Flucytosine | No dependable alternative. |
| E. Coccidioides immitis | Amphotericin B | Miconazole. |
| F. Cryptococcus neoformans | Amphotericin B with or without flucytosine | No dependable alternative. |
| G. Dermatophytes (tinea) | Clotrimazole (topical) or miconazole (topical) | Tolnaftate (topical); haloprogin (topical) griseofulvin. |
| H. Histoplasma capsulatum | Amphotericin B | No dependable alternative. |
| I. Mucor | Amphotericin B | No dependable alternative. |
| J. Paracoccidioides brasiliensis | Amphotericin B | A sulfonamide; miconazole. |
| K. Sporothrix schenckii | An iodide | Amphotericin B. |
| IX. MYCOPLASMA | | |
| Mycoplasma pneumoniae | An erythromycin or a tetracycline | |
| X. RICKETTSIA - Rocky Mountain spotted fever; endemic typhus (murine); tick bite fever; typhus, scrub typhus; Q fever | A tetracycline | Chloramphenicol. |
| XI. PNEUMOCYTIS CARINII | Trimethoprim-sulfamethoxazole | Pentamidine. |
| XII. SPIROCHETES | | |
| A. Borrelia recurrentis (relapsing fever) | A tetracycline | Penicillin G. |
| B. Leptospira | Penicillin G | A tetracycline. |
| C. Treponema pallidum (syphilis) | Penicillin G | A tetracycline; an erythromycin. |
| D. Treponema pertenue (yaws) | Penicillin G | A tetracycline. |

| Infecting Organism | Drug of First Choice | Alternative Drugs |
|---|---|---|
| XIII. VIRUSES | | |
| A. Herpes simplex (keratitis) | Vidarabine (topical) | Idoxuridine (topical). |
| B. Herpes simplex (encephalitis) | Vidarabine | No alternative. |
| C. Influenza A | Amantadine | No alternative. |
| D. Vaccinia | Methisazone with or without vaccinia immune globulin | No alternative. |

G-5