One of the most striking facts observed was the discrepancy between the amount of displacement of the apex-beat and that of the cardiac dullness in the change of position of the patient. The change in the apex-beat amounted in some cases to 5 cm. or 6 cm., while that of the cardiac border of dullness was only 2 cm. or 3 cm., and vice versa, so that, as far as our experience teaches us, these two factors are not always as constant as one might expect them to be. This may be due to the fact that in changing the position of the body there occurs a twisting of the heart on its long axis, thus making considerable alteration in that portion of the heart which comes in contact with the chest-wall as the apex-beat.

In the 193 cases there were nine in which there was total displacement of the heart downward, the so-called cardioposis of Rummo. In seven of these there were clinical signs of atheroma of the aorta. The low position of the apex in these cases on first impression suggested aortic valve disease until the cardioposis was discovered, which to me emphasizes the importance of invariably testing the mobility and position of the heart before assuming from an abnormal position of the apex-beat that dilatation or hypertrophy is present. Close examination in all of these cases of cardioposis showed that the heart *en masse* was displaced downward from one to two interspaces.

Of the forty-nine persons in health, consisting largely of high school students, the average displacement of the apex-beat from the dorsal position to the left lateral position was 3.02 cm. to the left, while the right border of cardiac dullness changed only 1.04 cm. The greatest change in the apex-beat was 5 cm. and that of cardiac dullness 8 cm.

The smallest change in the position of the apex-beat was 2 cm. and that of cardiac dullness was in patient M. K., aged 15, apparently well, in whom there was no change in the mobility of the heart from the dorsal to the left lateral.

Of the 144 patients selected routinely, suffering from various diseases, the average change in the apex-beat with the patient changing from the right lateral to the left lateral position, was 3.9 cm., the change in cardiac dullness, 2.7 cm. The maximum displacement of the apex-beat was 14 cm. in a case of pulmonary tuberculosis. In another tuberculous subject the displacement amounted to 10.5 cm.; in another, 13.5 cm. In one case of mitral regurgitation the displacement of the apex amounted to 9 cm., in another to 7.5 cm., and in still another to 8.5 cm. In other patients with the same diagnosis, however, the mobility of the apex was normal or diminished, so that the mobility of the heart in these conditions was by no means characteristic. The greatest mobility of the cardiac dullness was 12.8 cm., in a case of pulmonary tuberculosis. In a second case of tuberculosis it was 12 cm. In the cases of cardiac pericarditis with adhesions, the displacement of the apex-beat was 3.6 cm., and the change in the cardiac dullness with change in position of the patient from the right lateral to the left lateral was 3.3 cm. No differences in the displacement of the heart were observed in mitral and in aortic valvular lesions. In the six cases clinically diagnosed as pericarditis, two being confirmed at autopsy, with adhesion of the outer pericardium to surrounding structures, there was fixation of the heart; no change in either the position of the apex-beat or cardiac dullness occurred when the patient changed from the right to the left lateral postures.

The impressions from this study, imperfect as it is, are, first, that the determination of the movability of the heart is of considerable value in the differential diagnosis of cardiac dilatation, and that before assuming that the heart is dilated to the right or to the left, the movability of the heart should always be determined.

Secondly, the immobility or fixation of the heart should always arouse the suspicion of adhesion of the pericardium to neighboring organs. There is probably no serious heart lesion diagnosed less frequently, clinically, than pericarditis with adhesions. Since systolic retraction of the interspaces and other signs of this condition are so frequently absent, it seems that it would be well to emphasize immobility or fixation of the heart as one of the signs of pericardial adhesions.

My thanks are due Drs. J. W. Nevius and J. W. Bardill for assistance in the production of this paper.

In addition to the authorities already cited, the following may be consulted:

- Pottenger: Displacements of the Heart and Diaphragm, *Interst. Med. Jour.*, June, 1911, p. 605.
Groedel: Roentgen Rays in Heart Diagnosis, *Interst. Med. Jour.*, June, 1911, p. 615.
Satterthwaite: Mobility and Malpositions of the Heart, *Internat. Clin.*, II, ser. 21, p. 55.

THE BACTERIOLOGY OF THE EAR*

JESSIE B. HUDSON, M.D.
IOWA CITY, IA.

Determining the variety of bacteria present in disease of the ear is an aid to prognosis and warns us of possible complications. Single infections are usually acute, while mixed infections are apt to become chronic. There are very few cases of sinus thrombosis reported as due to pneumococci, but streptococcus sinus thrombosis is of common occurrence. Streptococci also frequently cause brain abscess and may involve important structures by necrosis, or may cause a fatal septicemia. Hence, it is important to know whether these organisms are present. Streptococci and pneumococci appear to be the most frequent cause of otitis and mastoiditis. Staphylococci are found in a large percentage of chronic cases, seldom in pure culture.

Most investigators do not consider infection with staphylococci likely to be serious, but operation is necessary in about half the cases of infection with *Streptococcus pyogenes* or *Streptococcus mucosus*. If meningococci are found we know the patient has, or is likely to have, meningitis.

Examination of ear discharges is important in cases infected with diphtheria bacilli in order that proper precautions may be taken to prevent the spread of the disease. Newsholme (1904) reports a case of infection with diphtheria from a case of otorrhea—a pure culture of diphtheria bacilli being obtained from the ear discharge. Graham-Smith (1904) reports five cases, infected with virulent Klebs-Loeffler bacilli from contact with a patient having otorrhea. Several others have obtained virulent diphtheria germs from the ear. Diphtheria-like bacilli are often found in ear cases; a small percentage of these are virulent. Nuttall and Graham-Smith found 10 per cent. virulent. It is necessary to make cultural tests and animal inoculations before making a positive diagnosis of diphtheria.

* Read in the Section on Pathology and Physiology of the American Medical Association, at the Sixty-Second Annual Session, held at Los Angeles, June, 1911.

In many reported cases, examination for bacteria was made only after puncture of the ear-drum. It is very difficult to sterilize the external auditory canal and drum-head so as to get uncontaminated cultures from the discharge. Leutert was the first to take cultures at the time of operation. He found streptococci predominating. In chronic cases staphylococci were most numerous. He thinks sinus thrombosis and brain abscess caused almost exclusively by streptococci. Newman and Ratten, in an article on "Etiology of Acute Otitis Media," come to practically the same conclusions. Libman found streptococci predominating. Barnhill and Wales report two-thirds of complications due to streptococci. McKenna says that *Streptococcus mucosus* is frequently found in otitis media, which explains its relative frequency as a cause of acute meningitis. Richardson mentions it as a cause of mastoid disease. Bacon thinks that most cases of acute otitis media are due to the influenza bacillus.

Infection may reach the middle ear through a ruptured drum-head, through the petrosquamosal fissure in the infant, through defects in the tegmen covered over with fibrous tissue, or in fracture of the temporal bone. It may travel along the nerve sheaths or blood-vessels, or the blood may carry infection to the ear. These cases, however, are rare. Microorganisms most frequently reach the ear from the nose and throat through the Eustachian tube. The chief predisposing factor is an inflammation of the nasopharynx or nasopharyngeal obstruction. Acute infection in the middle ear, with inefficient drainage or lack of proper treatment, is one of the most frequent causes of mastoiditis. A lowered vitality, exposure to wet and cold, and also certain constitutional diseases act as predisposing factors.

The question as to whether bacteria are present in the normal mastoid antrum is an important one. If they are present, then some relatively unimportant predisposing cause, as exposure to wet and cold, or loss of vitality from general or local causes, will give these bacteria an opportunity to develop and cause pathologic changes and loss of function, to a greater or less extent, and possibly serious complications.

Many investigators claim that the normal tympanic cavity and mastoid antrum contain pathogenic germs, few in number, which become active under favorable conditions. Others are just as positive that no pathogenic germs are present. The tympanum communicates with the Eustachian tube in front and with the mastoid antrum and cells behind. Since the Eustachian tube admits air to the middle ear, there seems to be no reason why it should not also admit bacteria from the throat.

A number of cases have been reported in which the mastoid was primarily involved. Two to 4 per cent. of typhoid patients have ear complications, the mastoid often being involved. Various organisms are found—staphylococci, streptococci, diplococci, colon bacilli, etc., thus apparently showing that a lowered vitality is the predisposing factor and that bacteria are already present.

In the following twenty-one cases, I have collected the material at the time of operation, made cultures and isolated and identified the bacteria. The material for examination was collected in sterile Petri dishes, and was then transferred to flasks containing 100 c.c. of sterile broth; an agar culture was also made by pouring agar on the material remaining in the Petri dish. These were incubated for twenty-four hours at 37 C, and then agar and gelatin plates were made. The plates were incubated from twenty-four to forty-eight

hours. The colonies were then examined—methylene-blue and Gram stains being made, also hanging drops to determine motility, after which cultures were made from the different colonies on the various sugar media, on gelatin, blood-serum, milk, litmus milk, potato, and glucose and lactose bouillon. Where necessary, smears were stained for spores, capsules and flagella.

REPORT OF CASES

Following are given the synopses of twenty-one cases as taken from the history sheets:

CASE 1.—N. G., aged 19. September 29, complains of a discharge from the left ear, a roaring sound in the ear, and constant headache. Trouble started four years ago and has gradually become worse. Complains of a slight sore throat. At first, ear discharged only when lying on left side. No pain at that time. Complains of pain only when she catches cold in ear. Discharge night and day. Cannot hear very well with left ear. Whooping-cough when 2 years old and measles at 12. Perfectly well at present except for ear trouble. In left ear bone, conduction is better than air.

Diagnosis.—Chronic discharge from left ear, chronic mastoiditis left.

Operation.—October 1, radical mastoid—left.
Bacteriology.—Staphylococci and an unknown bacillus in left tympanic cavity. Streptococci found in left ear, December 6.

November 19, double suturing of left mastoid wound. Discharged February 9.

October 5, ear began discharging last Thursday and has been discharging ever since. March 8, left ear has been discharging for last two weeks. Sense of fullness in left side of head. Dull ache back of left ear.

Result.—Complete recovery. No improvement in hearing in left ear.

CASE 2.—E. T., aged 13. November 3, complains of ear-ache in left ear. Ear has discharged for many years. Some impairment of hearing. Aches only in winter. Trouble starts as soon as cold weather sets in. Discharge and ear-ache whenever patient catches cold. Past history not known, patient being an adopted child.

Examination.—Bone and air conduction equal in left. Drum-head badly scarred.

Diagnosis.—Adenoids and diseased tonsils, chronic otorrhea—left.

Operation.—November 5, left radical mastoid with dura exposed.

Bacteriology.—Streptococci, *Staphylococcus aureus* and *albus*.

Plastic Operation.—November 19.

An autogenous vaccine was prepared and given every seven days in the following doses:

FIRST—	
Streptococci	5,000,000
Staph. alb.	100,000,000
Staph. aureus	100,000,000
SECOND—	
Streptococci	10,000,000
Staph. alb.	200,000,000
Staph. aureus	200,000,000
THIRD—	
Streptococci	15,000,000
Staph. alb.	400,000,000
Staph. aureus	400,000,000
FOURTH—	
Streptococci	20,000,000
Staph. alb.	600,000,000
Staph. aureus	600,000,000
FIFTH—	
Strept.	30,000,000
Staph. alb.	80,000,000
Staph. aureus	800,000,000
SIXTH—Same as Fifth.	

Result.—Complete recovery; patient gained in weight, and health much improved.

CASE 3.—H., schoolboy.

Diagnosis.—July 17, serous catarrh middle ear.

Operation.—Simple mastoid—left.

Bacteriology.—Staphylococci.

Operation.—August 4, adenoids and tonsils removed.

Result.—Complete recovery.

CASE 4.—R. B., aged 2.

Diagnosis.—February 23, acute mastoiditis, both sides.

Operation.—February 25, right simple mastoid.

Bacteriology.—Streptococci. March 6, diphtheria bacilli found in culture from right ear. The diphtheria bacilli were tested and found to be virulent.

Operations.—March 8, left simple mastoid. Sutured right. April 1, sutured left mastoid.

Discharged May 14.

CASE 5.—S. C., aged 22. April 24, complains of a growth on right mastoid. Commenced eight years ago. At times, patient says, it seems to puff up and then go down again. There has been no pain and no discharge. Never dizzy that she can remember. At times the growth is somewhat painful when pressure is made.

Diagnosis.—Mastoiditis.

Operation.—April 24, simple mastoid.

Pathology.—Enlarged glands over mastoid region, tip of mastoid somewhat diseased. Antrum normal. Laboratory report: One of the glands was sectioned and found to be lymphoid tissue, somewhat inflamed. Culture from the antrum showed numerous bacteria, including *Staphylococcus albus*.

Result.—Complete recovery.

CASE 6.—N. N., complains of loss of hearing and discharging ear. About two years ago noticed hearing was affected. The discharge began about six months ago.

Operation.—May 20, radical mastoid—right.

Pathology.—Dura exposed over tympanic cavity. Extensive necrosis along posterior wall.

Bacteriology.—Gram-negative streptococci, *Staphylococcus albus*.

Operation.—June 4, sutured right mastoid.

Result.—Complete recovery, hearing normal.

CASE 7.—F. A., aged 8. September 29. Ear trouble began two years ago. Had scarlet fever with diphtheria following. Had tonsils removed when he had diphtheria. Left ear began to discharge then and has been discharging nearly all the time since. Some better the past year. Had ear-ache at times before discharge began. Had to cleanse ear three or four times a day. Odor offensive. Mastoid region painful once in a while. Right ear discharged for a short time after attack. Hearing bad in left ear.

Examination.—Right ear normal. Left ear, high notes normal. Bone conduction better than air. Whisper, one foot; speaking voice, four feet. Perforation of drum-head, discharge from ear.

Diagnosis.—Chronic otorrhea.

Operation.—September 3, radical mastoid.

Pathology.—Necrotic bone removed from middle fossa exposing dura. Attic filled with granulations. Removed hammer. Found many cells about external auditory canal. Necrotic material next dura and pachymeningitis. Surface of dura inflamed, dura not bulging.

Bacteriology.—*Sarcina aurantiacca* and rhodococcus.

Result.—Complete recovery, no improvement in hearing in left ear.

CASE 8.—L. D., aged 17. October. Trouble began in right ear about a year ago, caused by a bad cold. Had severe pain in ear and mastoid tenderness for about a week. Could not hear well with that ear. There was a discharge for a few days at first. Has not discharged since then but has had much pain in ear and back of ear. For the last month pain has been constantly present.

Examination.—Right ear, high notes normal. Air conduction better than bone. Small hemorrhages on lower half of drum-head. Whisper, 15 feet; speaking voice, 40 feet. Caloric test showed labyrinth functioning. Left ear normal.

Operation.—October 7, simple mastoid—right.

Pathology.—Necrosis below antrum and over angle of lateral sinus. All cells inflamed.

Bacteriology.—*Sarcina* was the only organism found. Patient completely recovered.

CASE 9.—Patient, aged 26. October 29 had had trouble with right ear for thirteen years, since scarlet fever. For the last three months it has been discharging constantly—pain at times.

Examination.—Perforation in drum-head. Right tube open. Ear might get well with packing and inflation. Right ear, whisper 4 inches; speaking voice 20 inches. Left ear, whisper 15 feet; speaking voice, 35 feet.

November 28. Needs radical mastoid.

Operation.—December 1, right radical mastoid.

Pathology.—Exposed lateral sinus at knee; sinus was thickened and covered with granulations. Necrosis down to facial canal; necrosis above and posteriorly. Polyps in tympanic cavity. Facial nerve unaffected after operation.

Bacteriology.—*Staphylococcus aureus*.

Result.—Complete recovery from operation; no improvement in hearing.

CASE 10.—G. R., aged 10. November 9. Complains of ear trouble. Had tonsillitis four weeks ago, and after a few days his left ear began to discharge. Had ear-ache in left ear during his attack of tonsillitis and just before the ear began to discharge. The discharge stopped last Saturday, when he noticed a swelling behind his ear. Says it is not sore unless he presses it. Hearing somewhat impaired. Does not breathe through his nose at night and only a part of the time during the day. Had measles when 8 years old. Past medical history otherwise negative.

Diagnosis.—Acute mastoiditis.

Operation.—November 11, left simple mastoid. Adenoids removed.

Pathology.—Open sinus leading into antrum. Much pus present. Dura not exposed. Parasinus abscess and external dural abscess. Lateral sinus exposed full length.

Result.—Complete recovery.

Bacteriology.—Streptococci.

CASE 11.—H. J., aged 16. November 18. Hurt in a runaway in March. Unconscious three or four hours. Has had trouble back of ear and in back of head since. Both ears discharged some at times since then. Has had paracentesis of left ear-drum once, and of right, three or four times. This relieves pain for a time. Pain begins in back of head and head throbs. Tenderness over right mastoid extending back almost to occipital protuberance since accident. Had vomiting spell just after accident but none since. Headache all the time.

Examination.—Right and left ears normal.

Diagnosis.—Traumatic mastoiditis or periostitis and osteitis.

Operation.—November 2, right simple mastoid. Removal of necrotic bone posterior to mastoid region, exposing lateral sinus and dura.

Pathology.—Circular area of necrotic bone below lateral sinus three and one-half inches posterior to external auditory canal. Extended to dura. Periosteum black over this area. Periosteum peels off with difficulty. Mastoid antrum and cells normal. Posterior emissary vein one inch posterior to mastoid. Lateral sinus exposed. Dura exposed in right occipital region and appears normal.

Bacteriology.—*Staphylococcus albus* and *aureus* and an unknown bacillus found in mastoid antrum.

December 17, ear began to pain and drum was bulging. Paracentesis done. Found only serum. *Staphylococcus albus* found in discharge. January 12. Paracentesis right drum. February 16, discharged—perfectly well.

CASE 12.—R. F., schoolboy. November 1. Says his ears have discharged ever since he can remember. No other history obtainable.

Examination.—Right ear, yellowish discharge. Perforated drum-head. High notes normal. Bone conduction better than air. Whisper 3 feet; speaking voice 10 feet. Tests show labyrinth functioning. Left ear—yellowish discharge. Perforated drum-head. High notes normal. Bone conduction better than air. Whisper, 15 feet; speaking voice, 30 feet. Tests show labyrinth functioning.

Diagnosis.—Double chronic otorrhea.

Operations.—November 4, right antromastoid. Adenoids removed. November 11, left radical mastoid. November 18, plastic operation.

Pathology.—All mastoid cells necrotic. Lateral sinus not exposed. Pus in attic. Exposed dura. Pachymeningitis.

Bacteriology.—Pneumobacillus.

Pathology.—Tip necrotic. Necrosis anterior and external to facial—very extensive. Much necrosis at opening of Eustachian tube. One arm of incus gone. Malleus in fair shape. Cerebellum exposed just under lateral sinus.

Bacteriology.—Pneumobacillus.

January 2, left ear well; right improving. No improvement in hearing in left; about two-thirds normal in right.

CASE 13.—L. C., aged 17. November 26. Left ear discharged when a baby. No discharge after that for six or seven years. Since then, whenever he catches cold the ear discharges. Discharge yellowish, has bad odor. No pain in ear. No pain or swelling over mastoid region. Thinks he cannot hear with this ear.

Examination.—Right ear, air conduction better than bone. High notes cut down. Whisper, 15 feet; speaking voice, 40 feet. Left ear, high notes cut down. Bone conduction better than air. Whisper, 6 inches; speaking voice, 25 feet. Tests showed labyrinth functioning. Perforation of drum the size of pea.

Diagnosis.—Chronic otorrhea.

Operation.—December 2, left radical mastoid.

Pathology.—Complete necrosis of mastoid. Posterior fossa exposed. Exposed dura. Shiny material in antrum.

Bacteriology.—*Staphylococcus aureus* and *Micrococcus tetragenus*.

Patient developed slight facial paralysis December 4, which lasted until December 13. Went home before ear was well. Not known whether he had further trouble.

CASE 14.—W. W., aged 17. November 5. Had tonsils removed ten years ago. Two years ago adenoids removed. Since that operation, ears have been discharging almost constantly. Turbinates large and fibrous. Remains of tonsils infected. Left, voice, 8 inches; right, whisper, 10 feet. Advised to have nose repaired first, and at same time have ear treated twice a day. Later, if necessary, mastoid operation.

October 7, acute tonsillitis. October 19, left inferior turbinate trimmed. Has a very high arch with an overhanging bite. Arch should be widened. November 16, right inferior turbinate trimmed. November 26, paracentesis left drum-head.

Operation.—December 19, left meatomastoid. Dura exposed in middle fossa; lateral sinus exposed and whole mastoid necrotic.

Bacteriology.—Colon bacillus and *Bacillus diphtheriae*.

Result.—Patient well, no further trouble with ear, hearing about one-fourth of normal.

CASE 15.—E. G., aged 16. December 13, complains of discharging ears. Puffing noise constantly in right ear. Says hearing is impaired in right ear. Normal in left. When a baby, had discharge from both ears; does not remember how long it lasted. Seven years ago one discharged, does not remember which one or how long it lasted. Last April he had mumps on both sides and two weeks later measles. Ears both began to discharge when the patient had mumps. Left one discharged for two months, right one ever since—occasionally stopping for a day or two at a time. Some pain below right ear and in front of mastoid. No pain or swelling behind ear. Discharge was of a yellowish color, profuse and had an offensive odor. Has been treated for past three months.

Physical Examination.—Pus in external meatus. Drum-head thickened. High notes normal. Air conduction better than bone. Whisper, 2 feet; speaking voice, 12 feet. Test showed labyrinth functioning. Adenoids present. Punctured right and left nasal antrum and found a small amount of old pus in left.

Diagnosis.—Mastoiditis, right.

Operation.—December 16, right simple mastoid, also adenoids removed.

Pathology.—Eburnated bone in cortex. Antrum and neighboring cells filled with pus.

Bacteriology.—Pneumobacillus.

December 30, taken to isolation ward for erysipelas beginning about 1 inch anterior to right ear. Began December 28. January 2, had a little tenderness over tip of left mastoid. January 3, swelling on left side of neck just below mastoid.

Operation.—January 12, paracentesis—right. Discharged. March 1, comes back because her right ear is discharging—started two weeks ago. Discharged April 7. Ears well, hearing about one-half normal in right ear.

CASE 16.—A. P., aged 16. December 15. Was slow in learning to talk. At times hears fairly well. When he takes cold, hearing is affected. To-day hears loud voice at 6 inches only. Sleeps with mouth open.

Examination.—Left drum-head scarred and retracted. Right external canal filled with pus. Right ear, loud voice, 6 inches; left ear, cannot hear speaking voice. Tonsils and adenoids should be removed. Needs a meatomastoid operation.

Operation.—December 16, radical mastoid.

Bacteriology.—Colon bacillus.

Operation.—December 28, adenoids removed.

Result.—Complete recovery from operation; hearing in right ear about one-half normal.

CASE 17.—E. V., aged 15, January 7. Ear trouble began one week ago last Monday. Left ear began to ache, continued to ache for a couple of days, and then began to discharge. Has been discharging ever since and is painful most of the time. Mastoid region swollen after ear began to discharge. Had influenza and sore throat about one week before ear trouble began. Says she had ear-ache a great deal about eight years ago; does not remember which ear or whether it discharged any. Breathes through mouth day and night. When she catches cold has a dull pain over right antrum. Had ulcerated tooth on right side above one or two years ago. Nose constantly discharges—yellowish—no odor.

Physical Examination.—Right ear normal. Left ear, perforation of drum-head with discharge of pus. Drum-head bulging. Tenderness over mastoid. Pain in ear most of the time. High notes normal. Bone conduction better than air.

Diagnosis.—Left otorrhea and mastoiditis.

Operations.—January 7, paracentesis left ear-drum. January 13, left simple mastoid.

Pathology.—Mastoid cells small and all filled with pus. Not much necrosis. Exposed lateral sinus at knee.

Bacteriology.—Streptococci, some of them Gram-negative. *Micrococcus catarrhalis*. Hay bacillus.

Discharged February 15. Ears normal.

CASE 18.—M. G., aged 16. January 16. Has had trouble in right ear as long as she can remember. If she catches cold, she has ear-ache. Three or four years ago had ear-ache in right ear a great deal. One year ago, right ear discharged for two or three weeks. Discharge was purulent. Since then no discharge until middle of December, when she had measles. December 26, had a severe ear-ache; discharge began and has continued ever since, stopping at times for a day or two. Ear has been very painful; was swollen over mastoid region a part of the time. Ear and mastoid region have been massaged by an osteopath. Says she had tonsillitis several years ago, also on left side, when she had measles. Has had sore throat occasionally and could open her mouth only one-half inch.

Physical Examination.—Tenderness over mastoid. Pulsating ear-drum. Abscess under temporal muscle. High notes normal. Bone conduction better than air conduction.

Diagnosis.—Mastoiditis—right. Probably abscess under temporal muscle.

Operation.—January 20, right simple mastoid. Paracentesis right ear-drum.

Pathology.—Abscess in temporal muscle. Pus in mastoid antrum. Exposed lateral sinus. Badly necrosed bone extending to dura. Has pachymeningitis and perisinus abscess, with inflammation of walls of sinus. Dead bone lying next to brain and attached to dura. Bone between temporosphenoidal lobe and sinus all rotten. Granulations on lateral sinus. No evidence of leptomeningitis or local brain abscess. Dura not tense.

Bacteriology.—Staphylococci and Gram-negative streptococci.

February 10, sutured right mastoid. February 26, patient came back for examination; was to come twice a week for treatment. April 4, discharged—ear well.

May 11. Has come back for treatment of other ear. Hearing improved.

CASE 19.—L. R., aged 19. January 26. Right ear began aching January 25. Discharge began January 26; purulent and bloody. Soreness over mastoid; left ear aching some at present.

Operation.—February 23, simple mastoid, right. Results good.

Pathology.—All mastoid cells necrotic; dura not exposed.

Bacteriology.—*Streptococcus* and *Staphylococcus albus*.

Results.—May 13. Discharged, complete recovery.

CASE 20.—Mrs. L., aged 41. February 1. Sunday morning had an ear-ache. Right ear pains; has roaring in ears; hears water running, katydids, etc.

Examination.—Left drum-head retracted; pain on pressure over tip of right mastoid. Right ear, loud voice 4 feet; left, whisper 3 feet.

Diagnosis.—Right ear, abscess with mastoid involvement. Had ulcerated upper molar on right side. Just above second molar on right side is a discharging sinus. Has had discharge from nose before. Exploratory puncture of right antrum; lots of pus.

Diagnosis.—Empyema of antrum of Highmore secondary to necrotic tooth.

Operation.—February 3, right simple mastoid. Infected with gas-producing organism; gas bubbled up when antrum was approached and also when ear-drum was cut. Pain in antrum.

Bacteriology.—*Streptococci*, *Micrococcus aerogenes capsulatus* and *B. subtilis*.

Operation.—Right radical antrum, middle and third molars removed. With the third there came away a part of the alveolar process, which was necrotic, and left an opening into the antrum. Antrum was filled with polyps.

March 24, canal has been dry for several days.

May 2, mastoid and antrum well. Return for closure of opening between antrum and month. Result normal.

CASE 21.—M. G. March 3. Last Wednesday had a sore throat and right ear started to ache, is still aching. Has a sense of fullness in right side of head. Mastoid region very tender. Glands at angle of jaw very painful. Six weeks previously had appendicitis and was operated on. A few days later temperature rose to 105 F., and examination showed an abscess at site of operation. Bacteriologic examination of the pus showed streptococci. She recovered from this and was about to be discharged from the hospital when the ear trouble began.

Ear discharged when she was a very small child. Also discharged last year. Tonsils become inflamed whenever she catches cold. Are inflamed now. Cannot see very well; wears glasses. Has headache, photophobia; eyes water a great deal.

Left ear normal. Right ear, drum head bulging and a little red. Slight tenderness at mastoid tip. Bone conduction better than air conduction. High notes normal; whisper, 10 inches; speaking voice, 6 feet.

Operations.—March 3, paracentesis, right ear. March 10, right simple mastoid.

Pathology.—Necrosis of antrum; dura over middle fossa and lateral sinus exposed. Granulations over middle fossa on dura.

Bacteriology.—Gram-negative streptococci.

This case is particularly interesting from the fact that the ear infection followed so soon after the appendicular abscess and was caused by the same organism. The infection was evidently carried by the blood. Recovery complete.

In two of these cases the mastoid antrum was normal and pathogenic bacteria were found. In one other case not included in this series, I found pathogenic bacteria in the normal antrum.

There were thirteen chronic cases and six acute cases.

In seven chronic cases, staphylococci were found. In only two cases were they the only organism found. In three of the chronic cases streptococci were present, but

not in pure culture. In two chronic cases pneumobacilli were found in pure culture. Colon bacilli were found in two chronic cases, once in pure culture, once with *Bacillus diphtheriae*.

Diphtheria bacilli occurred as a secondary infection in one acute case. In the six acute cases streptococci were found, three times in pure culture. In one acute case Gram-negative streptococci were the only germs found. Staphylococci were found in one acute case—not in pure culture. *Micrococcus aerogenes capsulatus*, *Micrococcus catarrhalis* and *B. subtilis* were found in mixed infections. In many cases no history was obtainable as to the cause of the disease. In two cases ear trouble followed scarlet fever; in one mumps and measles; in one influenza; in one tonsillitis; in one removal of adenoids; in one the disease followed empyema of the antrum of Highmore, secondary to a necrotic tooth. One was made worse by an attack of measles. Five cases were aggravated by taking cold. In most of the chronic cases and in one acute case, necrosis was extensive. It did not appear to be worse where streptococci were present.

SUMMARY AND CONCLUSIONS

1. Bacteria are normally present in the mastoid antrum. This is to be expected since there is a continuous passage from the throat through the Eustachian tube and middle ear to the antrum.

2. Mastoiditis is caused by a variety of organisms. Those found in my cases were *Staphylococcus*, *Streptococcus*, *Micrococcus catarrhalis*, diphtheria bacillus, *B. coli communis*, pneumobacillus, *B. aerogenes capsulatus*, *Micrococcus tetragenus*, sarcina, and *B. subtilis*.

3. In three cases of ear disease Gram-negative streptococci were found.

4. The few patients who were treated with vaccines after operation were remarkably benefited.

I wish to thank Dr. Dean for the opportunity of studying these cases, also for the suggestions he has given me in my work, and for the use of his private library.

207 North Capitol Street.

New and Nonofficial Remedies

THE FOLLOWING ADDITIONAL ARTICLES HAVE BEEN ACCEPTED BY THE COUNCIL ON PHARMACY AND CHEMISTRY OF THE AMERICAN MEDICAL ASSOCIATION. THEIR ACCEPTANCE HAS BEEN BASED LARGELY ON EVIDENCE SUPPLIED BY THE MANUFACTURER OR HIS AGENT AND IN PART ON INVESTIGATION MADE BY OR UNDER THE DIRECTION OF THE COUNCIL. CRITICISMS AND CORRECTIONS ARE ASKED FOR TO AID IN THE REVISION OF THE MATTER BEFORE PUBLICATION IN THE BOOK "NEW AND NONOFFICIAL REMEDIES."

THE COUNCIL DESIRES PHYSICIANS TO UNDERSTAND THAT THE ACCEPTANCE OF AN ARTICLE DOES NOT NECESSARILY MEAN A RECOMMENDATION, BUT THAT, SO FAR AS KNOWN, IT COMPLIES WITH THE RULES ADOPTED BY THE COUNCIL.

W. A. PUCKNER, SECRETARY.

CALCIUM PHENOLSULPHONATE—Calcii phenolsulphonas

—Calcium Sulphocarbonate.—Calcium 1,3-phenolsulphonate. $[\text{C}_6\text{H}_4(\text{OH})\text{SO}_3]_2\text{Ca} = \text{Ca}(\text{C}_6\text{H}_4\text{O}_3\text{S})_2$ is the neutral calcium salt of para-phenolsulphonic acid.

Calcium phenolsulphonate occurs as a white, or faintly pinkish-white, almost odorless powder, having an astringent, bitter taste. At high temperatures the salt chars, emits inflammable vapors having an odor of phenol, and finally leaves a residue of calcium sulphate.

The salt is easily soluble in water and in alcohol. An aqueous solution of the salt (1-100) should assume a pale violet color on the addition of ferric chloride test solution.

If 5 Gm. of the salt be percolated with 25 Cc. of ether in a small filter, the solvent allowed to evaporate spontaneously and the residue, if any, dissolved in 5 Cc. of water, the solution should