extent of causing undue heat and moisture of the skin, a circumstance which, as already mentioned, may bring on eczema in certain persons.

There are many formulæ for mild stimulating and astringent ointments, such as diachylon ointment; oil of cade in vaseline, three per cent.; benzoated lard, with or without oxide of zinc or bismuth; boric acid in vaseline, four per cent., etc. All of these act beneficially, in part at least, by excluding the air from the inflamed skin. Olive oil or vaseline should be used freely to soften scales and crusts, so that they can be wiped away; some warm emollient poultice is a useful adjuvant to these, if the softening effect of the oil is insufficient. When the skin is greatly thickened, indurated, and covered with dry, exfoliating epidermis, stronger stimulation is indicated. Under these circumstances one of the following ointments may advantageously be employed: an ointment containing tar or ammonio-chloride of mercury; a mixture of equal portions of ung. picis liq. and zinc ointment; simple benzoinated lard, or the latter with four or five per cent. of the ammonio-chloride; and, finally, ichthyol and benzoinated lard. Acetum cantharidis, which is a still stronger stimulant, has been found to act better than any other remedy in allaying the itching and reducing the brawny infiltration of the skin. This effect is due to the free serous transudation which it induces. It may be painted over the affected part with a cotton-wool swab once every twenty-four hours, until the proper effect is obtained—that is, exfoliation of all thickened epidermis and softening of the skin, which then becomes covered with a thinner and more normal epithelium. Should the reaction be excessive, some soothing ointment will allay all discomfort in a few hours. The process may be repeated every few days until all thickening has disappeared. Many authorities highly recommend nitrate of silver—in solutions of from two to four per cent. or even greater strength—as a local application in chronic eczema. Painted over the surface after all scales have been removed, it stimulates the epithelium to a more healthy growth, especially after the thickening of the skin has been reduced by the use of the remedies already mentioned. For the relief of fissures in the skin of the meatus the writer has found repeated painting with a strong (ten to twenty per cent.) solution of silver nitrate most efficient. Practitioners who are in the habit of prescribing arsenic in all cases of chronic eczema will do well to remember that this treatment has not found much favor with dermatologists of the present time; its effects, although sometimes favorable, have on the other hand often been found decidedly injurious.

True Diphtheritic Otitis Externa does sometimes occur, but very rarely, and then almost always as a complication of scarlatinous diphtheritis of the throat and middle ear (Politzer). Primary diphtheritis of the meatus has been observed during epidemics of diphtheritis; but in these few instances there already existed an inflammation or excoriation of the meatus, and it was in this favorable soil that the accidental infection occurred. This primary form is said not to be attended with constitutional disturbance and readily yields to treatment.

A false membrane of a dirty white color and firmly adherent to the walls of the meatus is characteristic of diphtheritic otitis externa. When the membrane is forcibly removed, the exposed parts are found tender to the touch, excoriated, ulcerated, and bleeding. Severe pain, a feeling of fulness, tinnitus, and deafness only occur in the primary form of this disease; when it is associated with diphtheritis of the throat and middle ear, there is little or no pain, but there may be anæsthesia of the parts around the ear (Wreden, Wendt, Blau). Primary diphtheritic otitis externa usually terminates in recovery without injury to the ear. The consecutive form (in reality a diffuse otitis externa) is apt to result in destructive ulceration of the membrana tympani, exfoliation of the ossicles, and more or less extensive caries of the temporal bone. Such destructive changes depend upon the severity of the original disease—diphtheritic inflammation of the fauces, or the angina of scarlatina with tympanic complications.

The *treatment* of diphtheritic otitis externa should be antiseptic. Lime-water instillation, followed by syringing with a solution of boric acid, will favor separation of the membrane (Burkhardt-Merian). After syringing, the meatus may be filled with powdered boric acid. Carbolic glycerin (1 to 15), carbolic spirit (1 to 20), or a solution of boric acid in spirit (1 to 20), may be painted over the affected parts if the membrane, after being once detached, tends to form again. Forcible detachment of the membrane is injurious and likely to be followed by fresh infection of the denuded surface and an aggravation of the local condition. The treatment with antitoxin and the employment of constitutional remedies are indicated in this as in other forms of diphtheria.

Syphilitic Affections of the Meatus are discussed in one of the later articles of this series, and the reader is therefore referred to this for information upon the subject.

Exostoses and Hyperostoses of the external auditory canal are not of infrequent occurrence. They are congenital or acquired, and may be single or multiple, spongy or eburnated, pedunculated or with broad base. Their favorite situations are at the outer portion of the osseous meatus, or at its inner extremity, close to the membrana tympani. Occasionally they entirely close the lumen of the canal, but only in this event, or when the already narrowed meatus becomes blocked with secretion, do they cause much disturbance of hearing. This is the more likely to occur because the presence of these tumors favors inflammation of the cutaneous lining of the meatus. Exostoses are often bilateral, and they are much more frequent in the male than in the female sex. The causes of acquired exostoses have not been determined with certainty. Rheumatism, arthritis, and syphilis are spoken of as constitutional causes, but these tumors are often hereditary and unassociated with any of these diseases. Among the aborigines of America and the natives of the Sandwich Islands, they seem to occur with special frequency; in the latter, excessive indulgence in sea bathing, with the consequent irritation of the auditory canals by salt water, is alleged to be the cause of this development. Local processes involving chronic hyperæmia of the auditory canal seem to predispose to overgrowth of the adjacent bone, sometimes in the form of diffuse hyperostoses but more often as circumscribed outgrowths or exostoses. When they coexist with chronic suppuration of the middle ear, their presence forms an additional source of danger by favoring retention of pus. Fig. 1706 gives a good idea of the appearance presented by multiple exostoses. They usually appear as white or yellowish, smooth prominences, and when examined with a probe are found to be exceedingly firm to the touch. This feature serves to distinguish them from all other pathological formations in the meatus, even when the skin covering them is red and inflamed.

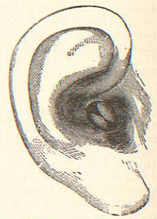


Fig. 1706.—Two Exostoses of the External Auditory Canal, in Contact Internally. (After Toynbee.)

Small exostoses may last a lifetime without detriment to the subject, but larger osseous growths are apt to give trouble by favoring the accumulation of cerumen, epidermis, etc.

Treatment.—Medication, local or general, with a view to procuring absorption, is useless. When the exostoses are of small size and present no evidences of irritation, they should not be interfered with. If chronic suppurative disease of the tympanum is present it should, if possible, be healed; if this is impracticable, the auditory canal must be kept scrupulously clean. An accumulation of secretion beyond the growths may, with care, be removed, even through a small aperture. The offending substance may, if necessary, first be softened by injecting a few drops of warm solution of carbonate of soda (1 to 20) through a suitable cannula, the point of which is pushed into the aperture; then, on the following day, a free injection of warm water through the same instrument will probably bring the accumulation away. When the narrowing of the canal is too great to admit of such cleansing measures, and there are great deafness and deep-seated pain, indicating pressure from retained secretion, surgical removal of the exostosis may become imperative, or a counter-opening, extending down to the antrum, may be established in the mastoid process. The operative procedure to be chosen will depend chiefly on the particular characters of the case. If the growth is obviously pedunculate and can be surrounded by a suitable steel snare wire, it may be removed in this way, or the peduncle may be broken by a few taps with chisel and mallet. As a rule, however, growths of this kind requiring operative interference are of a more sessile kind and must be chiselled away piecemeal or drilled through at their bases and then detached with chisel and mallet. Formerly, operations of this kind were done through the external meatus, but the difficulties encountered were such as to make some easier method desirable. This has been attained by first detaching the auricle from behind, throwing it forward, and so exposing the comparatively short bony canal—a procedure which has been found greatly to facilitate removal of the growth, especially if it springs from the inner portion of the canal.

Absence of the Meatus.—Occasionally the meatus is found terminating as a smooth, cutaneous cul-de-sac, without any appearance of a tympanic membrane; the canal, under these circumstances, being smooth, pale, and shorter than normal. This condition results from ulcerative inflammation of the meatus, with immediate contact and union of its walls, or the union may take place through the intervention of granulation tissue. The atresia may be formed by osseous or fibrous tissue, or it may consist of only a thin septum. If the obstructing tissue does not consist of bone, the fundus of the cul-de-sac will be found to be yielding and elastic. If, under these circumstances, bone conduction shows a normal condition of the internal ear, the septum may be divided or partially excised, and a permanent opening secured by the introduction of leaden pegs, or, better still, a smooth glass plug conical in shape may be retained in the canal until healing has taken place. Politzer relates a case of this kind in which he obtained great and permanent improvement in the hearing. The writer, too, has had excellent results through the use of a perfectly smooth glass cone instead of the leaden plug.

Polypi.—The development of pedunculated connective-tissue growths in the meatus is a common sequence of neglected chronic suppuration of the middle ear. Those which grow from some part of the tympanic mucous membrane will receive due consideration in the article which treats of the latter subject. Polypi may also develop from the lining of the meatus, their point of attachment commonly being the posterior or superior wall, near the membrana tympani, while only rarely do they originate from a more external part of the auditory canal. In the case of those growths which spring from the meatus, it is said that they often result from prolonged and injudicious poulticing.

Aural polypi are usually single; several may, however, grow simultaneously in one ear. Their surface is smooth or finely lobulated, and they are always covered with epithelium. They are sometimes large enough to fill the meatus, and they may even project for a short distance beyond the external orifice; others, again, do not exceed the size of a pea and present no external evidence of their presence. When they are small but yet large enough to be moulded by the meatus, their shape is globular, pear-shaped, or elongated. Those which project beyond the external meatus are of a pale color and have a surface covered with epithelium not unlike that of the adjacent integument.

The diagnosis of polypi presents no difficulties. Simple inspection will suffice to determine their presence. Malignant new formations, springing from the same parts, may possibly lead to an erroneous diagnosis. Careful exploration of the meatus with a blunt probe will generally enable the surgeon to determine the point of attachment of the polypus. According to Politzer, pale-red or pearl-gray polypi, with a smooth or moderately rough surface, spring usually from the meatus; while the sodden, red, vascular, raspberry-shaped growths with villiform papillated surfaces, most frequently arise in the tympanic cavity.

The *prognosis* is generally favorable, especially in the case of polypi which spring from the meatus, their thorough eradication being less difficult than when the growth originates in the less accessible tympanum. Large polypi, of course, always act as mechanical impediments to hearing, and their removal may be followed by great improvement in the hearing power; the prognosis, however, must be guarded in this respect, even when there is reason to believe that the condition of the internal ear is normal, since the physical conditions in the middle ear (subject as it has been to the pathological changes incident to a long period of chronic suppurative inflammation) may render a restoration of the hearing impossible.

Treatment.—Removal of polypoid growths is always advisable; it may be accomplished in various ways. When the fact can be established that the growth springs from the walls of the meatus, its extraction by means of Wilde's or Blake's snare may be undertaken. The loop of the snare should be tightened around the pedicle of the growth, close to its insertion, and the operation completed by traction; or, if a moderate amount of traction will not suffice, ligature of the polypus may be effected by rotating the instrument on its long axis until a greater resistance is felt; whereupon the wire is cut loose from the cross bar and the instrument removed, leaving the twisted wire loop around the pedicle. This causes strangulation and death of the growth.

If there is a probability that the growth springs from the membrana tympani or from the tympanic cavity, it should be snared off as deeply as possible, traction not being admissible on account of the damage that might accrue to the drum membrane. Politzer's annular knife is also a valuable instrument for the excision of polypi. Small pedunculated growths may sometimes be crushed, or removed with suitable forceps, or with one of Buck's loop curettes. In most cases, after removal of the mass, the root will require to be touched at intervals of three or four days with chromic acid, applied very carefully, under good illumination, by means of a cotton-tipped probe.

The galvano-cautery may be used with advantage for the removal of large, firmly attached fibroid polypi, and also for cauterizing granulations and the remnants of polypi. Its use is said to be followed by less inflammatory reaction than is observed after the employment of caustics.

As the subject of benign growths in the external auditory canal is fully discussed by the writer of the article on chronic suppurative inflammation of the middle ear, and inasmuch as there are to be special articles devoted to malignant new growths and to injuries of the ear respectively, the present writer considers himself at liberty to omit all further mention of these subjects in this article.

Frank Buller.

EAR DISEASES: ALTERATIONS IN THE TYMPANIC MEMBRANE AND ADJACENT BONY WALLS DUE TO FORMER DISEASE.—Inasmuch as the active or current changes of the drumhead and adjacent walls incident to the various diseases are to be dealt with in the more clinical articles, it is here designed to present the sequent and more persistent changes and, in any overlapping of fields, to take the standpoint of the morbid anatomy and the general processes producing them. My topic does

not deal with the drum membrane alone, but also with the related structures: for clinical otology is accepting in slowly increasing degree the teachings of aural anatomy

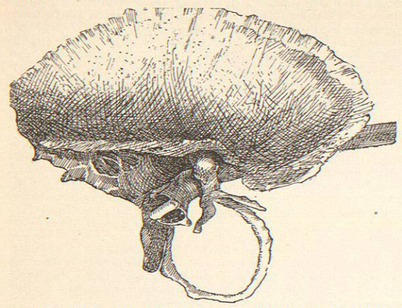


FIG. 1707.—Inner Aspect of Squama in its Relation to the Annulus and Ossicles. The scute is partly hidden by the incus and malleus head, but the posterior and descending portions are well shown, with the tegmen roofing in both antrum and attic.

which we owe to Leidy, and is recognizing that the tympanum includes always the antrum and attic as well as the lower cavity, and hence that its outer bony wall must be considered with the membranous. And just as modern anatomy has ceased to lay stress upon those details of structure, like the bony labyrinth, which have a merely picturesque interest but are without developmental or physiological importance, so as pathologists we should slight mere morbid changes, however demonstrable as results, in favor of the study of the perverted processes which they indicate and which it is our clinical duty to combat.

The outer wall (more strictly the lower, as it looks more down than out) of the tympanum consists of the tense or vibrating drumhead, the flaccid membrane above the folds that stretch in both a backward and a forward direction from the short process, and the bony wall (*pars ossea*, Walb) that separates the attic and antrum from the auditory meatus. This last is in the adult an undefined part of the canal wall; but in the infant it is a triangular process of the squama (the "scute" of Leidy) which can be readily detached from the petro-mastoid to uncover these upper tympanic cavities (Fig. 1707). From this plate all of the upper and most of the back wall of the canal develops, just as the remainder of the wall is the outgrowth of the tympanic bone or annulus. Hence the region of election for opening the antrum, and the *spina supra meatum* which marks it in the adult, are located, at least in infancy, in the squamosal and not in the true mastoid portion of the temporal bone. But it is only the innermost part, corresponding with the undeveloped "scute," which remains a bounding wall of the tympanic spaces.

Something of the same sort may also be said of the original annulus, since the bottom of the tympanum proper almost undermines it, forming a "cellar" (Kretschmann) below. The usual lack, in this region, of septal folds interfering with drainage makes it far less liable to special involvement than the antrum and attic; although it is not infrequently the seat of persistent caries, and its close relation to the bulb of the jugular and the lower curve of the carotid can render such a caries serious.

As the triangular light spot should constitute the most conspicuous feature of the normal drumhead (Plate XXV., Figs. 1 and 2), so its alterations are among those most easily recognized. Its changes of form, brightness, and position are dealt with in relation to the tympanic inflammations by other contributors; yet some reiteration seems fair in regard to so important a matter. Based upon the glossy smoothness of its epiderm, the oblique position and the centrally depressed but slightly convex contour of the membrane, the light spot is generally seen downward and forward from the tip of the malleus handle, because this part only of the drumhead is at right angles to the line of illumination and of sight and can thus reflect back to the observer the light thrown upon it. The light spot can be shortened by slight depression, reduced to a point by more marked retraction, altered to a crescent or even to a peripheral line concentric with the annulus by distinct cupping, changed to a more horizontal or vertical direction by localized displacement, or divided fan-like by plications of a relaxed membrane. Its lustre may be dulled by œdematous maceration of the epiderm or lost when this is extreme or exfoliation is going on; and it is important in this section to note that these, which are often the earliest symptoms in the inflammatory process, are also generally the last persisting vestiges of its course. The light spot may be simulated by reflection from fluid in front of the drumhead or even from a mass of wax with its greasy lustre, when carelessly observed through a poorly illuminated canal; and it may be absent from view simply because the tortuosity of the canal humps up the floor or anterior wall so as to hide the region of the light spot from view.

Any change from the typical cusp-like triangle of light in the anterior inferior quadrant, or any reflection elsewhere from the surface of the drumhead, is to be closely scrutinized as anomalous if not strictly pathological. Depression of the flaccid "Shrapnell" membrane above the short process usually gives a point of light here which is of evil import, and the prominence of the posterior fold or of any other protruding portion of the membrane can give a reflection from its convex surface. The play of these light spots under the pneumatic speculum is also

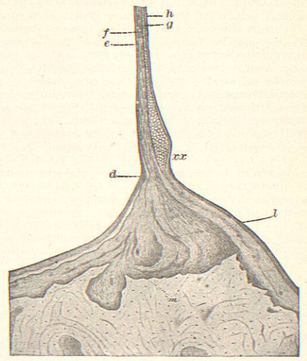


FIG. 1708.—Vertical Section of Lower Part of Drumhead. × 35. (Brunner.) On the left the skin of the canal thins as it passes over the tendinous annulus (*l*), until at *d* it is hardly more than epiderm (*e*); so too does the tympanic mucous membrane on the right (*h*). The membrana propria shows its radiate fibres (*f*) passing into the thickened fibrous annulus for insertion into the bony groove (*m*); while the transversely cut circular fibres, sparse at *g*, thicken at the margin into a firm ring (*xx*).

full of instruction, not only as to the past and present of the case, but also as giving at times indications for successful treatment.

The color of the drum membrane may also show much of meaning. Normally of a rather bluish-gray, it ought

EXPLANATION OF
PLATE XXV.

EXPLANATION OF PLATE XXV.

FIG. 1.—Normal left drum membrane as seen by suffused daylight.

FIG. 2.—Normal right membrane by lamplight.

FIG. 3.—Rupture of a partially thinned left membrana tympani by a kiss. Slight ecchymosis of the lower flap-like margin of the tear, with injection of the vessels of the manubrium.

FIG. 4.—Rupture of the left drum membrane by a box on the ear. Ragged rent with extravasation in the wound margins and injection of the vessels along the malleus handle. The rent extends nearly vertically behind the umbo and gapes slightly.

FIG. 5.—Rupture of the left membrane by puncture with a knitting-needle. Ecchymosis at the lower periphery of the rounded opening and injection of the manubrium vessels.

FIG. 6.—Double rupture of the right membrana tympani caused by a fall into the water. Slight injection. A semilunar rent in upper posterior quadrant and a longer, more crescentic tear below. Both are rather parallel to the circular fibres.

FIG. 7.—Ecchymosis on the right membrana tympani back of the tip of the malleus handle.

FIG. 8.—Pigmentation of the region of the umbo in the right membrana tympani—the remains of an extravasation.

FIG. 9.—Fracture of the malleus handle on the left, with malposition of the anteriorly displaced lower fragment. Retraction of the cicatrized neighborhood of the umbo, with distorted reflection of light and crescentic opacity of the lower anterior quadrant.

FIG. 10.—Injection of the cutis of the upper half of the right drum membrane. Slight dulling of the lustre or obscuring of details.

FIG. 11.—Radiate injection of the right membrana tympani. The malleus handle hidden by vascularization, and only the short process visible.

FIG. 12.—Acute myringitis of the left membrana tympani. Inflammation limited to upper half, where a hemispherical swelling hides all details except a faint indication of the short process.

FIG. 13.—Acute myringitis of the left membrane, with intense radiate dark injection. Exfoliated epithelium upon the posterior portion and a line of purulent fluid below.

FIG. 14.—Acute myringitis of the right membrana tympani, with two abscesses in the posterior half.

FIG. 15.—Granulations upon the left membrane in chronic myringitis.

FIG. 16.—Chronic myringitis, with concealment of all details by epidermal exfoliation.

FIG. 17.—Chronic myringitis of the left membrana tympani, with radiating injection, swelling of the entire membrane, and a sac-like bagging posteriorly filled with pus.

FIG. 18.—Ulceration of the right membrana tympani in chronic myringitis. Line of pus collection below.

FIG. 19.—Cholesteatomata on the left membrana tympani, after the removal of an impacted mass of cerumen. Injection of the vessels of the manubrium and dulling of the light triangle.

FIG. 20.—Exostoses upon the left drum membrane, before and behind the manubrium.

FIG. 21.—Sunken left drumhead in simple acute otitis media, with prominence of the posterior fold, dark coloration of the membrane, and bright point in front of the short process.

FIG. 22.—Strongly indrawn right drumhead in a case of acute simple otitis media. Marked prominence of the posterior fold; broken triangle of light and anomalous light spot in front of the short process.

FIG. 23.—Marked retraction of the left membrana tympani in acute catarrhal otitis. Both anterior and posterior folds prominent; incus shank discernible; "kneeing" of the intermediary zone, and dark coloration of the membrane.

FIG. 24.—Injection and swelling of the left membrana tympani in acute simple otitis media.

FIG. 25.—Exudation in the right drum cavity, with curved surface line visible through the membrane.

FIG. 26.—Exudation with angular surface line in the left tympanum; marked prominence of the posterior fold; punctate light spot in front of the short process.

FIG. 27.—Distention of the upper posterior quadrant of the left membrana tympani by serous exudation.

FIG. 28.—Sac-like distention of the posterior half of the right membrana tympani. Acute otitis media simplex, with diffuse injection of the membrane.

FIG. 29.—Bubbles formed by the air douche in the exudate within the left tympanum.

FIG. 30.—Distention of the left membrana tympani by exudate in simple acute otitis media. Bulging hyperæmia and swelling of the entire membrane.

FIG. 31.—Crescentic opacity of the posterior portion of the left membrana tympani in chronic otitis media simplex.

FIG. 32.—Peripheral opacity of the right membrane in chronic catarrh.

FIG. 33.—Flaky opacity of the left membrana tympani in chronic otitis media.

FIG. 34.—Sunken, clouded membrane, with prominent posterior fold and quadrate reflex.

FIG. 35.—Radiate atrophic areas in the opaque R. membrana tympani.

FIG. 36.—Atrophic left membrana tympani, showing the incudo-stapedial joint.

FIG. 37.—Atrophic and relaxed L. membrane in chronic catarrhal otitis.

FIG. 38.—Distention of the posterior half of the right membrana tympani by yellowish exudate.

FIG. 39.—Hyperæmia of the promontory in sclerotic catarrh of the tympanum, showing through the retracted membrane.

FIG. 40.—Right membrana tympani, showing hyperæmia and swelling of its mucosa, and opacity in the membrana propria.

FIG. 41.—Milky opacity of right membrana tympani, with marked peripheral thickening and broken light spot.

FIG. 42.—Thickened and sunken left membrana tympani, with shining through of promontory; sclerosis.

FIG. 43.—Broadened and distorted manubrium; promontory discernible; sclerotic catarrh.

FIG. 44.—Attachment of the umbo to the promontory in case of marked retraction of right membrana tympani.

FIG. 45.—Adhesion of the upper posterior quadrant of the sunken drum membrane to the chorda tympani and the incudo-stapedial joint. Umbo in contact with promontory.

FIG. 46.—Adherent bands in lower posterior part of tympanum tying down the membrane.

FIG. 47.—Injection, swelling, and discoloration of the right membrana tympani with congestion of the manubrium; crescentic light reflex, and exudation in tympanum visible in lower portion. Acute suppurative otitis media.

FIG. 48.—Small perforation in lower anterior quadrant of the injected left membrana tympani. Exfoliation of epidermis hiding manubrium and leaving but faint indication of the short process. Small (pulsating) point of light from the fluid in the perforation. Acute otitis media suppurativa.

FIG. 49.—Purulent collection in front of lower portion of right membrana tympani hiding details.

FIG. 50.—The same membrana tympani after cleansing. Perforation back of umbo; gray-red membrane with irregular and dim light spot. Acute suppurative otitis media.

FIG. 51.—Pouting perforation of the posterior portion of the right membrana tympani. Membrane red, especially the very prominent posterior half. At the nipple-like apex of its lower part, a small perforation. Light reflex broad and faint, and short process barely discernible.

FIG. 52.—Small perforation in Shrapnell's membrane above the short process, from which a drop of exudation is hanging. Membrana flaccida red and swollen, and manubrium strongly injected. Broken light spot.

FIG. 53.—Recent perforation in the swollen and livid R. drum membrane, showing a (pulsating) point of light from the fluid within it. Membrane bluish-red, with sodden flakes of exfoliated epidermis giving here and there tiny glistening reflections. Vessels along malleus handle visible. Fluid in the bottom of the meatus gives a faint crescentic reflex.

FIG. 54.—Small perforation in centre of anterior half of membrane in chronic suppurative otitis. Membrane dull, with apparently thickened manubrium, and the mucosa of the inner tympanic wall dark red.

FIG. 55.—Perforation in the upper posterior quadrant of the right membrana tympani in chronic suppuration with caries. The dislocated incus is seen in the opening.

FIG. 56.—The same membrane several months later, showing thickening along the manubrium, the incus gone, and the stapes visible. Granulation masses hang out over the lower margin of the opening.

FIG. 57.—Reniform perforation in lower half of membrana tympani, with thickening of the membrane, especially along the malleus handle, and dulness of the surface. Glistening layer of fluid near anterior margin.

FIG. 58.—Heart-shaped perforation involving the major part of the left drumhead, leaving but a narrow remnant along the manubrium and at the periphery. Discharge has ceased and the tympanic mucosa appears yellowish-red, with a glistening streak posteriorly and branching vessels upon the promontory.

FIG. 59.—Central perforation of the middle of membrana tympani, with the tip of the manubrium projecting into the opening, through which the congested inner wall can be seen.

FIG. 60.—Partially adherent central perforation, with marked retraction of the membrane. Manubrium drawn in and up, and posterior fold prominent. A cicatricial band fastens the upper margin of the opening to the congested promontory. Comma-shaped reflection of light.

FIG. 61.—Double perforation in lower part of the left membrana tympani in chronic suppurative otitis media. Manubrium indrawn; light spot broken and tympanic mucosa injected.

FIG. 62.—Two large oval perforations of the right drum membrane, leaving but a narrow band of normal membrane extending up to the malleus handle. Anteriorly a whitish crescent of chalk deposit. Discharge has ceased and the promontory is reddish-yellow.

FIG. 63.—Large, round perforation, with marked retraction of the right membrana tympani, through the upper part of which the incus is discernible. Promontory red and hyperplastic.

FIG. 64.—Extensive destruction of the right drum membrane, leaving but a narrow periphery, with such retraction of the manubrium that it is almost lost to view. Thickening around the short process, and granular condition of tympanic mucosa.

FIG. 65.—Large perforation in lower anterior quadrant, filled by polypoid granulations of the mucosa of the tympanum, standing out as a raspberry-like mass in the plane of the membrane.

FIG. 66.—Perforation in lower quadrant, through which projects a knob of polypoid granulations hiding the margins of the opening. Manubrium markedly retracted, with prominence of the posterior fold. Crescentic opacity of the posterior part of the membrane.

FIG. 67.—Commencing cicatrization of a perforation below the umbo of a much retracted left membrana tympani, with "cone of light" extending in upon the bluish-gray scar tissue.

FIG. 68.—Scar in anterior portion of opaque and retracted left membrana tympani. Broadening of the tip of manubrium and area of thickening of membrane posteriorly.

FIG. 69.—Central heart-shaped perforation closed by a thin cicatrix. Light spot upon the depressed scar, and thickening of the perforation margins.

FIG. 70.—Central depressed cicatrix of L. membrane, with the tip of malleus handle projecting into the opening. Chalk deposit near anterior margin.

FIG. 71.—Almost complete replacement of the left membrana tympani by scar tissue. Marked retraction of manubrium, behind which the incus is visible. Broken reflex upon the indrawn cicatrix.

FIG. 72.—Two rounded cicatrices in L. membrana tympani, with retracted malleus handle. The membrane is thin and dark above, showing the descending process of the incus, but gives a marked cone of light below.

FIG. 73.—Cicatrized double perforation, with irregular chalk deposit below in the right drum membrane.

FIG. 74.—Sunken left membrana tympani, with thin cicatrix which closes a rounded perforation below, bellying out after the inflation.

FIG. 75.—Irregular crescent of calcification in posterior portion of the dull left drumhead.

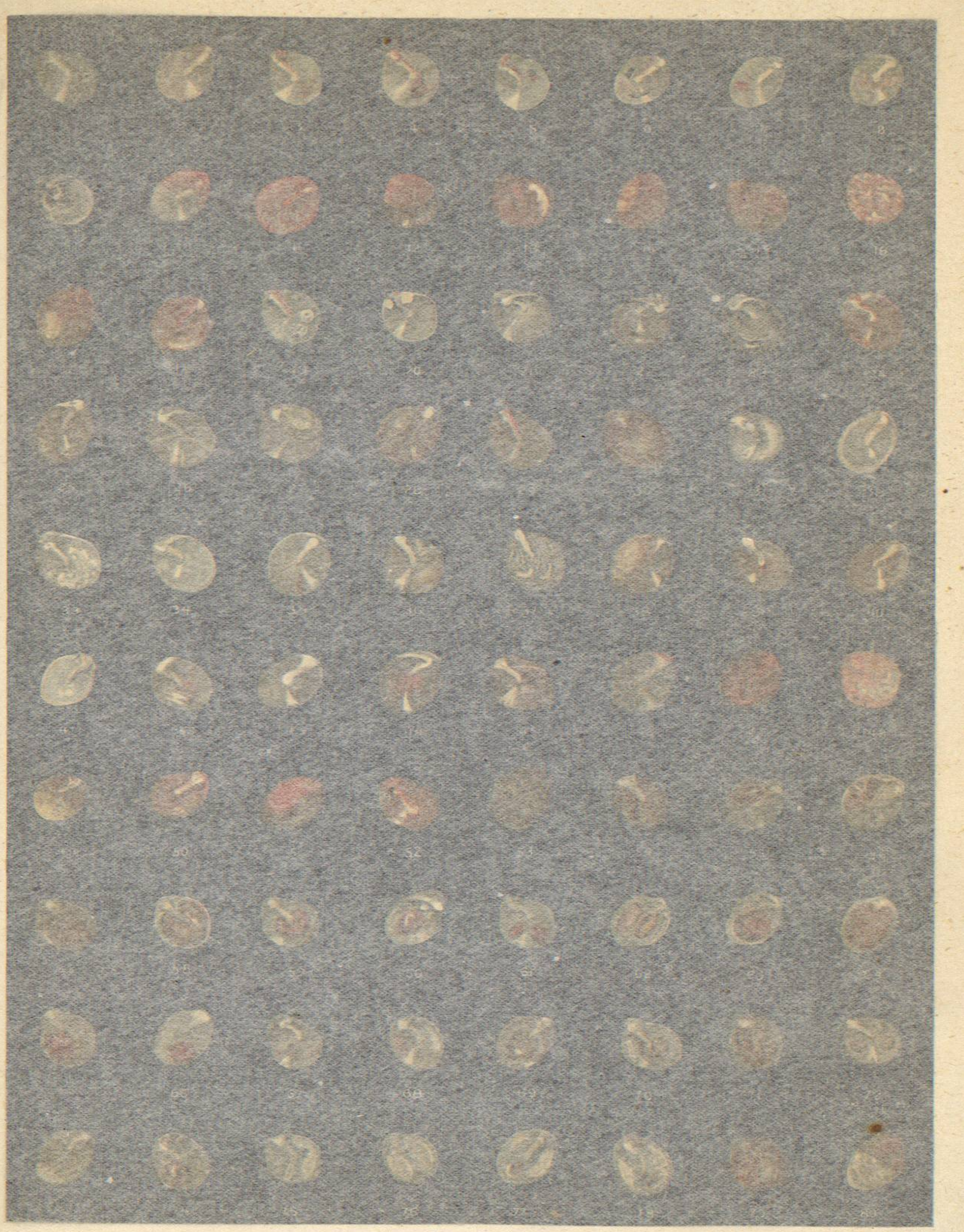
FIG. 76.—Two oval deposits of chalk in the left membrana tympani, occupying the greater part of each half of the membrane, and extending, on either side, close to the manubrium.

FIG. 77.—Right membrana tympani, showing a large calcified area anteriorly, a small one up and back, and a perforation below with chalk deposit in its thickened lower margin.

FIG. 78.—Left membrana tympani, with irregular chalky deposits on either side of a depressed cicatrix closing an oval opening, the lower margin of which is calcified.

FIG. 79.—Dark-red retracted left membrana tympani, with large perforation, out of the anterior portion of which a dark crimson polypus protrudes. Promontory yellowish-red.

FIG. 80.—Cholesteatomatous mass protruding from a perforation in the red and swollen right membrane.



The Human Tympanic Membrane, in Health and in Disease.

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