

PATHOLOGICAL RESEARCHES
INTO THE
DISEASES OF THE EAR.

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SINCE the publication in the *Medico-Chirurgical Transactions* of my two former papers, on the Pathology of the Ear,* further research has enabled me to arrive at certain results, which it is hoped will not be deemed uninteresting to the profession.

The dissections on which the observations contained in this communication are based, amount to 915; and may be thus classified:

1. Ears of persons known to be deaf	184
2. Ears of persons supposed to be deaf	70
3. Ears in the stage of incipient deafness	358
4. Ears in a healthy state	303
Total	915

The *first class* of cases, though including some instances hereafter specified, where the degree of deafness was but slight, comprises none in which a decided diminution of the power of hearing had not been perceptible during life.

The *second class* of cases embraces those where, though the information was defective as to the state of hearing in the life-time of the parties, such extensive traces of disease were

* Volumes XXIV, 1841, and XXVI, 1843. The results of the one hundred and twenty dissections described in these two papers have been included in the subjoined tables.

found in essential parts of the auditory organ, as to leave little doubt that deafness had existed. In the absence, however, of positive information, they are classed as cases of supposed or probable deafness.

The *third class* of cases exhibits those wherein there was a decided pathological condition of the organ, though probably not to the extent which would induce a very perceptible degree of deafness. These I have termed cases of incipient deafness.

It will doubtless excite some astonishment that, in so large a number as 915 dissections, so small a proportion as about one third of the ears should have been found in a perfectly natural state. At first view this might seem to arise from the specimens having, many of them, been supplied from hospitals, infirmaries, and other public institutions, and consequently liable to have been affected, as the result of the various diseases under which the parties might have laboured, and also from the circumstance of my having been kindly furnished by some of my professional friends with special cases, whose diseased state had, during life, attracted their attention. To those, however, who have given the subject much consideration, and who are aware of the widespread prevalence of deafness, in its varying degrees, among all classes of society, the dissections will not, perhaps, be thought to exhibit any unusual proportion of diseased to healthy specimens.

In the accompanying Tables it has been my endeavour to give the leading features of the several dissections in as concise a form as possible. In the first and second class of cases, however, it seemed indispensable to set forth, in succinct detail, the relative pathological conditions presented by different parts of the organ, as also the sex and age of the patient, and the cause of death. The third class of cases, those of incipient deafness, admitted of briefer treatment, and only the general result of their pathological state is exhibited; but it will give me great pleasure to afford, to any member of the profession, fuller information from the original notes of the dissections.

The last of the tables is an abstract statement, intended to show at a glance the pathological condition of the 612 ears included in the preceding classes.

Although I am fully sensible that it would as yet be premature to attempt to deduce any very extensive general conclusions as to the causes of deafness, and the nature of diseases of the ear, from the dissections now brought under the notice of the profession—and each day's experience leads me to infer that little is but yet known, compared with what future investigation may bring to light—yet there are certain observations, even at the present stage of inquiry into the subject, which are not devoid of professional interest, and which I may venture to make with the more confidence, from the fact that several dissections conducted by me, since the tables were framed, are singularly confirmative of the conclusions arrived at.

MEMBRANA TYMPANI.

In the cases of deafness, the membrana tympani will be observed to have been, in nearly one sixth of the dissections, whiter and thicker than is natural. As this appearance depends generally upon a thickened condition of the mucous membrane lining the inner surface of the tympanic membrane, while the external surface remains smooth and shiny, this feature becomes of great importance to the medical practitioner, as it affords him, during life, an indication of the state of the cavity of the tympanum.

Another frequent and highly interesting pathological condition of the membrana tympani is that in which it adheres by its inner surface to the promontory and the ossicula, or establishes a connexion with them through the agency of bands of adhesion. In the former state, the membrana tympani is necessarily very concave externally, and this concavity is readily distinguishable during life; in the latter, the membrane is only occasionally concave. The adhesion in both instances is so firm, as often to equal in strength the fibrous texture of the tympanic membrane itself. The latter

membrane is also much more tense than natural, and its power of vibration considerably diminished; in many instances, indeed, the tension is so great as to render it impassive to the loudest sounds.

In the formation of the above conditions, the adhesions are produced in the same way as those which will soon be alluded to as connecting the ossicula; but the adherence of the membrana tympani to the promontory grows out of the inflammation of the former membrane, during and subsequent to which, it and the tensor tympani muscle become very relaxed, the tympanic membrane falls inwards, and comes into contact with the mucous membrane covering the surface of the promontory. The latter also, in some cases, is so thickened as to touch and adhere to the healthy membrana tympani. During life I have seen it thick enough to protrude into the meatus, through an orifice in the tympanic membrane.

The proportion of specimens in those classed as deaf, where the membrana tympani appears to have been partially or completely destroyed, is larger, in my opinion, than among the cases occurring in practice, and may be accounted for from the greater attention which the existence of so very palpable a lesion would naturally excite. Although in these cases the sense of hearing was blunted, in many instances it was not so affected as to cause inconvenience in the ordinary intercourse of life. I may state, indeed, from a careful study of cases, some of which are now under my care, that the entire absence of the membrana tympani, provided no other disease of the organ of hearing coexists, is frequently but a trifling impediment to the perception of sounds.

TYMPANIC CAVITY.

A glance at the tables will show that the part of the organ of hearing which is the most frequent seat of disease is the cavity of the tympanum, and that, as described in my former papers, the peculiar pathological condition which characterises by far the greater number of cases, is a

thickened state of the mucous membrane lining that cavity. This membrane is found to vary from that natural state of fine expansion, which renders its presence on the surface of the bones scarcely perceptible, to a degree of thickness which nearly fills the cavity, and completely buries the ossicula. It was thicker than natural in not less than 98 out of the 184 dissections of deaf persons. And it is instructive to compare these numbers with the proportion of only 19 out of 184 in which there was a collection of mucus, since the latter affection has hitherto been generally regarded as one of the most fertile sources of deafness.

The most common contents of the tympanic cavity are mucus, purulent discharges, and scrofulous matter, which correspond with the three diseases, colds, scarlet fever, and scrofula, from which deafness so frequently results.

A pathological condition of great frequency in the tympanic cavity is the formation of bands of adhesion connecting the ossicula with each other, and with the walls of the tympanum. In 42 of the 184 dissections of deaf ears these adhesions were traced, and they were present in 123 of the 358 dissections classed as those of incipient deafness, or in the large proportions of $\frac{1}{4}$ and $\frac{1}{3}$ respectively. By far the most usual position of these bands of adhesion is between the stapes and the promontory, the former bone being frequently entirely concealed by them. Often their tension and firmness are so great as to prevent any movement of the stapes, while in many instances they press it towards the cavity of the vestibule, as formerly remarked. It would appear highly probable that the pressure exerted on the membranous labyrinth by these adhesions may be one cause of the singing and other sounds so commonly complained of by deaf persons.

The bands of adhesion sometimes arise from the effusion of lymph, which is occasionally observed; but more frequently, perhaps, from the circumstance that, when the membrane is much thickened, the portions of it which are in contact become adherent, so that when the body of the membrane subsides to its natural state, the points of con-

tact remain in cohesion, and the neighbouring parts are drawn into bands. The structure of the bands is firm, and very similar to that of the mucous membrane itself.

One of the most interesting conditions in the pathology of deafness is presented by the **anchylosis** of the base of the stapes to the margin of the fenestra ovalis, of which the specimens afford 16 complete and 10 partial instances. Sometimes this change consists of simple ossification of the membrane connecting the stapes with the margin of the fenestra ovalis; occasionally the base is considerably enlarged, and projects into the cavity of the vestibule; while in other instances it is surrounded by a deposit of osseous particles. My attention has also been very recently drawn to another condition of the stapes, which consists in its attachment to the circumference of the fenestra ovalis more firmly than is natural, a circumstance which is owing to the solidification of the membrane surrounding its base. Its occurrence is by no means infrequent.

The result of the examination of the Eustachian tube is deserving of particular attention. Of the whole 612 dissections of diseased ears, only 21 cases disclosed any traces of disease of this portion of the ear, a result, however, which agrees with my experience in cases of deafness.* Rarely indeed has it happened, when examining the ear with the otoscope,† during a forcible expiration with closed nostrils, that the air could not be distinctly heard to enter the tympanic cavities, though the nature of the sounds were modified by the internal condition of the cavity. While, to say the least, little or no good generally results from the use of

* It is right I should here state, that the trumpet-shaped extremity of the Eustachian tube was frequently not included in the parts removed for dissection. I am, therefore, unable to speak decidedly respecting its condition. It is, however, probable that, when the narrow portion of the tube was healthy and free from obstruction, the largely-dilated orifice which is acted upon so continually by the muscles of the palate, was also healthy.

† An elastic tube, about eighteen inches in length, tipped with ivory at both ends, one extremity of which is inserted into the external meatus of the patient, and the other into that of the medical man.

the Eustachian catheter, the failure of the operation for puncturing the *membrana tympani* affords a striking proof, from daily practice, that deafness seldom depends upon obstruction of the Eustachian tubes.

It is singular that another theory of the cause of deafness, which made it to depend upon disease of the internal ear, receives no countenance from these dissections. Even in the few cases, 21 in number, where the labyrinth exhibited disease, that disease was, in nearly every instance, found to be propagated from the middle ear. It may indeed be added, that disease originating in the cavities which contain the expansion of the auditory nerve, or in their contents, is a phenomenon of very rare occurrence.*

The fact of a thickened or otherwise deranged state of the mucous membrane lining the tympanic cavity being one of the most common pathological conditions of the organ of hearing, is the broadest general result of the dissections; and as cases carefully examined, noted and studied as they have arisen in practice, lead to the same conclusion, I have little hesitation in stating disease of that membrane to be the most usual cause of deafness. What are the history and symptoms of the great majority of cases of deafness unattended by discharge? Cold has been caught, uneasiness has been felt, renewed attacks of cold† have added to the severity of the symptoms; advice is at length sought, and examination shows the external meatus deprived of cerumen, and frequently deficient in natural sensibility, while, towards the *membrana tympani*, its appearance is red and smooth; the *membrana tympani* is entire, its surface shines, but it is

* In some dissections, especially those from deaf persons where adequate causes of deafness were found in the tympanic cavity, for the sake of preserving the diseased parts, the internal ear was not examined.

† Disease once commenced is modified by many slight and, commonly, little regarded circumstances,—as going from a warm room into the cold air, indulgence even in a glass or two of wine, after a meal, &c.; perspiration from active exercise gives temporary relief; distension of the tympanum with air either relieves or aggravates it; and the sounds so often complained of become louder under the influence of some of these circumstances.

hazy, opaque, or as white as parchment, and consequently the handle of the malleus may be discerned with varying degrees of distinctness, or cease to be visible at all. Upon a forcible expiration, with closed nostrils, the air, by means of the otoscope, can almost always be heard to enter the tympanum, not gradually, however, as when the organ is healthy, but with a puffing, bubbling, or cracking sound, as though impeded in its progress.

It is not my intention, in the present communication, to enter into the detail of the curative measures which the various affections resulting in deafness might seem to indicate, but there are two considerations to which I would direct the attention of the profession. The first is, the large number of cases of incipient disease, and their slow and imperceptible progress, which would reasonably lead us to hope that, by judicious treatment at an early period, the disease might be arrested in its progress, and a permanent cure effected. The other, that my own experience has shown me, that a careful perseverance in the course of remedial measures, which the pathological condition seemed to prescribe, has been attended with an almost unhopèd-for success, and would amply justify the expectation, that if a rational mode of treatment, based on careful examination and under intelligent medical guidance, be pursued, the beneficial results in the relief of a disease, in which the moral suffering far exceeds the physical, will be abundantly manifest, and the profession itself be ultimately rescued from the opprobrium which justly attaches to imperfect diagnosis, and consequent empirical measures.

In conclusion, I cannot refrain from subjoining a few remarks on the intimate and important relation which the pathological condition of the ear bears to derangements in other organs. In one third of the dissections, for instance, the upper wall of the tympanum was so attenuated, that the mucous membrane was only separated from the dura mater by a perfectly translucent layer of bone. The upper wall of the tympanum, in 54 other dissections, was imperfect, and

its mucous membrane was actually in contact with the dura mater. In 22 dissections, the lower wall of the tympanum was defective, and the mucous membrane was impinging on the internal jugular vein. The osseous lamina, separating the carotid canal from the tympanic cavity, is not unfrequently so thin as to be diaphanous; and the canal of the portio dura nerve, in its passage through the tympanic cavity, is often imperfect enough to allow of the mucous membrane coming in contact with that nerve. The mastoid cells, again, are frequently found separated from the lateral sinus by a layer of bone of translucent thinness. Sometimes the osseous floor of the external meatus is deficient, being completed by the jugular vein; while its anterior wall is in many cases thin, and in parts so defective, as to bring the membranous meatus in close contiguity with the articulation of the lower jaw.

Numerous cases of disease, propagated from the ear to the brain and the other important organs alluded to, have fallen under my notice, and no very long time will, I trust, elapse before they are prepared, with the dissections, for submission to the profession. For the present I shall confine myself to stating that among these dissections there are instances in which disease has spread,—from the tympanum, upwards, causing inflammation and suppuration of the dura mater, with abscess in the middle lobe of the cerebrum; from the tympanum, below, producing disease of the jugular vein; from the mastoid cells, posteriorly, giving rise to suppuration of the lateral sinus, and diseases of the cerebellum; from the tympanum anteriorly, causing contraction, and almost entire obliteration of the carotid canal, and disease of the internal carotid artery. There are other instances where paralysis of the portio dura nerve has ensued from the pressure upon it of the thick mucous membrane of the cavity of the tympanum; and lastly, where inflammation of the articulation of the lower jaw proceeded to the extent of causing the mouth to remain for some time closed, in consequence of disease being continued to it from the anterior wall of the meatus.

It will readily be conceived that I must be greatly indebted to many medical friends for valuable assistance in procuring specimens. To Mr. Crosse of Norwich, Mr. Ceeley of Aylesbury, Mr. Napper of Guildford, Mr. Greig of Bristol, for contributions from the country ;—and to my colleague, Dr. Blakely Brown ; Mr. Hewitt, assistant-surgeon of St. George's Hospital ; Mr. Henry James Johnson, formerly assistant-surgeon to the same institution ; Mr. Avery, surgeon to the Charing Cross Hospital ; Dr. Boyd, formerly resident physician to the St. Marylebone Infirmary, and to Dr. Allen, his successor ; to Dr. Goodfellow, formerly resident physician to the London Fever Hospital, and to Dr. Sankey his successor ; to Mr. Marston, resident medical officer of the Smallpox Hospital, Dr. Merriman jun., Dr. Edward Ormerod, Mr. Farish and Mr. Obre, of London, my sincere thanks are due ; and I beg to assure those gentlemen and other members of the profession, that for any opportunities they may afford me of further investigation I shall feel most grateful.

TABLE I.—CASES OF DEAFNESS (184).

No. of the Dissections.	Sex, Age, &c.	Cause of Death.	RIGHT EAR.					LEFT EAR.				
			Meatus Externus.	Membrana Tympani.	Cavitas Tympani.	Eustachian Tube.	Internal Ear.	Meatus Externus.	Membrana Tympani.	Cavitas Tympani.	Eustachian Tube.	Internal Ear.
40, 41	Man, æt. 55	Pneumonia	Dry. Cerumen absent	Opalescent	Mucous membrane thick; anchylosis of stapes to the fenestra ovalis	.....	.....	Dry; cerumen absent	Opalescent	Muc. memb. thick; anchylosis of stapes to the fenestra ovalis	.....	.....
47, 48	Woman, æt. 36	Dropsy	Contains pus. Cerumen absent	Destroyed by ulceration	Muc. memb. thick	.....	.....	.....	Thick and white	Muc. memb. thick; blood effused on its surface; adhesions between the ossicula; stapes concealed	.....	.....
72, 73	Man, 50	.....	Contains thick pus	.....	Muc. memb. thick; stapes concealed; malleus absent	Mucous memb. thick; covered with pus	.....	.....	Presents an ulcerated orifice	.....	Mucous memb. thick	.....
107, 108	Old man	Gangrena senilis	.....	.....	Muc. memb. soft, and covered with pus	.....	.....	.....	.....	Adhesions between stapes and promontory	.....	.....
134, 135	Man, 40 very deaf	.....	Contains a mass of hard cerumen	Presents a large orifice	Muc. memb. thick and ulcerated; incus disjointed from stapes; adhesions between malleus and internal wall of tympanum enveloping the stapes	.....	.....	.....	.....	Adhesions between the ossicula	.....	.....
150, 151	Boy, 16	Malignant disease of cervical glands	Lower wall imperfectly developed	.....	Muc. memb. thick and vascular; contains much mucus	.....	.....	Full of thick epithelium	Thick; adherent to promontory by a band	Muc. memb. thick and vascular; contains caseous matter	.....	.....

229, 230	Man, 50 (many years deaf, particularly in left ear)	....	Contains a mass of cerumen	Thick and white	Muc. memb. thick; adhesions between the ossicula and internal wall of tympanum	....	....	Contains lining memb. atrophied	Has an orifice; is thick & white; concave externally; adherent to promontory.	Muc. memb. thick; incus and malleus removed by absorption; cerumen projects through an orifice in the memb. tymp. into cavity of tympanum	....	Dura mater was nearly detached from bone
255, 256	Woman, æt. 68 (rather deaf)	....	Contains pus, in which is the incus	Destroyed by ulceration	Muc. memb. nearly destroyed by ulceration; osseous walls carious; internal carotid artery exposed; stapes nearly disconnected from incus and fenestra ovalis	....	....	....	More concave than natural	Adhesions between malleus and promontory	....	....
273, 274	Man, 59	Pneumonia	....	Almost effaced	Muc. memb. thick; covered with pus; carotid artery contracted	....	....	....	Almost effaced	Muc. memb. thick; covered with pus	....	....
281, 282	Man, 17	Fever; ill 9 days	....	Destroyed by ulceration	Muc. memb. thick and ulcerated; ossicula absent	....	....	Contains pus	Nearly all gone	Muc. memb. ulcerated; incus partially absorbed	....	....
283, 284	Man, 47	Typhus fever; ill 7 days	....	Red, and vessels distended with blood	Muc. memb. red and vascular	....	....	....	Vascular	Muc. memb. vascular	....	....
319, 320	Man, 30 (partially deaf all his life)	Injury to spine	....	....	Adhesions between stapes and fenestra ovalis by ankylosis	....	....	....	....	Muc. memb. thick; adhesions between stapes and fenestra ovalis by partial ankylosis	....	....

No. of the Dissections.	Sex, Age, &c.	Cause of Death.	RIGHT EAR.					LEFT EAR.							
			Meatus Externus.	Membrana Tympani.	Cavitas Tympani.	Eustachian Tube.	Internal Ear.	Meatus Externus.	Membrana Tympani.	Cavitas Tympani.	Eustachian Tube.	Internal Ear.			
341, 342	Man, 41 (deaf in right ear only)	....	....	Thick; white; firmly adherent to promontory	Muc. memb. thick; contains a caseous secretion; adhesions between malleus and promontory so as to conceal the stapes	....	....	....	....	....	Partially destroyed; adherent to the stapes and promontory	....	....	....
343, 344	Woman, æt. 64	Pneumonia	....	Concave; white; adherent to promontory	Muc. memb. thick; contains scrofulous matter; the incus, crura of stapes, and part of malleus have disappeared	....	....	Membranous labyrinth atrophied	....	....	Thick and opaque; upper half destroyed; adherent to promontory	Muc. memb. thick; malleus and incus have disappeared; stapes adheres to memb. tympani	....	....	Membranous labyrinth atrophied
349, 350	Woman, æt. 76	....	....	Calcareous; pre-vents an orifice, & adheres to promontory	Adhesions between stapes and promontory	....	....	....	....	....	Adhesions between stapes and promontory, so as to conceal the stapes	....	....	....	....
373, 374	Woman, æt. 38	Dropsy	....	Concave and dull; white at its centre, which is connected with the promontory	Muc. memb. so thick as to occupy great part of the cavity	....	....	....	....	....	Concave; hazy	Muc. memb. thick, soft, and vascular	....	....	....

385, 386	Man, 52	Dropy	.....	Opaque	Muc. memb. thick; adhesions between stapes and promontory by anchylosis	.....	.....	.....	Muc. memb. thick and soft; adhesions between stapes and fenestra ovalis by anchylosis	.....	Membranous labyrinth thickened
391, 392	Man, 53	Pneumonia (became deaf after scrofula when young)	Contains pus and epithelium	Destroyed by ulceration, except a band at anterior margin; the band bound by adhesion to promontory	Thick and covered with scrofulous discharge; ossicular and exostosed; tensor tympani muscle atrophied	.....	.....	.....	Muc. memb. covered with scrofulous discharge; ossicular and exostosed; tensor tympani muscle atrophied	.....
395	Man, 50	Diseased right ear only	.....	Nearly effaced	Muc. memb. thick; contains scrofulous matter; malleus removed	.....	.....	.....	Muc. memb. thick; contains scrofulous matter; malleus removed	.....
403, 404	Man, 26	Syphilitic disease of the cranial bones	.....	Opaque; internal layer thicker than natural	Muc. memb. thick and vascular; adhesions between the mastoid cells and stapes by a band of adhesion half an inch long	.....	.....	.....	Muc. memb. thick; portions of smooth bone lying on its surface	.....
413, 414	Man, 37	Accidental	Contains a collection of cerumen	.....	.....	.....	.....	.....	Muc. memb. thick, contains thick mucus	.....
419	Woman, 29	Diseased liver (deaf in right ear only)	.....	White & soft; presented an ulcerated orifice	Muc. memb. thick, soft, and ulcerated	.....	.....	.....	Muc. memb. thick, contains thick mucus	.....

No. of the Dissections.	Sex, Age, &c.	Cause of Death.	RIGHT EAR.				LEFT EAR.						
			Meatus Externus.	Membrana Tympani.	Cavitas Tympani.	Eustachian Tube.	Internal Ear.	Meatus Externus.	Membrana Tympani.	Cavitas Tympani.	Eustachian Tube.	Internal Ear.	
423, 424	Man, 46	Mortification of lungs	....	....	Muc. memb. thick	....	....	....	....	Upper part gone, lower part fallen inwards, & firmly adherent to stapes	Muc. memb. thick; malleus and incus pushed into the mastoid cells; adhesions between stapes and promontory	....	....
429, 430	Woman, 36 (especially deaf in right ear)	Consumption	....	Partly destroyed; the remainder calcareous	Muc. memb. thick; adhesions between stapes and fenestra ovalis by ankylosis	....	....	Membrane atrophied; fluid deficient	....	Muc. memb. thick; adhesions between stapes and promontory	....	....	....
435, 436	Girl, 11	Consumption	....	Concave & opaque; at its posterior part, the margins of which are attached to stapes	Muc. memb. thick; the long process of incus has disappeared	....	....	....	....	Opaque and concave	Muc. memb. thick, soft, and vascular; contains pus and mucus	....	....
441, 442	Woman, 70	Pneumonia	Contains dark pus	Soft and concave; adherent to promontory and stapes	Muc. memb. very thick	....	....	....	....	Contains calcareous deposit	....	....	....

445, 446	Man, 80	Asthma	....	Connected with inner wall of tympanum by numerous adhesions	....	More vascular than natural	....	Connected with promontory by adhesions	....
457, 458	Man, 25, (especially deaf in left ear)	Fever	....	Mucous membrane vascular	....	....	....	Adherent to malleus by a firm band	Muc. memb. thick; contains only matter
465, 466	Woman, æt. 94	Apoplexy	....	A small portion only remains, which is attached to promontory	....	....	....	Thick and opaque; upper part firmly adherent to promontory and stapes	Adhesions between the ossicula; stapes drawn into vestibule
477, 478	Woman, æt. 34	Fever; ill six weeks	....	Muc. memb. thick; adhesions between stapes and fenestra ovalis by partial anchylosis	....	....	....	....	....
483	Woman, 41 (deaf in right ear only)	Dropsy	....	Dull	....	....	Labyrinthine humors deficient	....	Adhesion between stapes and fenestra ovalis by complete anchylosis
499, 500	Woman, 60 (especially deaf in left ear)	Gangrene	....	Very concave and opaque	....	....	....	....	....
505	Woman, 40 (deaf in right ear only)	Consumption	Contains epithelium and pus	Entirely destroyed	Labyrinthine fluids disappeared	Muc. memb. thick, and red; contains a large quantity of thick mucus; tensor tympani muscle atrophied

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			Meatus Externus.	Membrana Tympani.	Cavitas Tympani.	Eustachian Tube.	Internal Ear.	Meatus Externus.	Membrana Tympani.	Cavitas Tympani.	Eustachian Tube.	Internal Ear.			
509, 510	Man, 22 (especially deaf in left ear)	Consumption	.....	Contains patches of calcareous matter; connected with promontory by bands thicker than natural	.....	.....	.....	Nearly entirely destroyed by ulceration	.....	.....	Muc. memb. very thick	.....	.....	.....
517, 518	Man, 56	Consumption	.....	White and thicker than natural	Muc. memb. so thick as nearly to fill tympanic cavity	.....	.....	.....	.....	.....	Muc. memb. very thick	.....	.....	.....
521, 522	Man, 50	Consumption	.....	White and vascular	Muc. memb. thick and vascular; tensor tympani muscle atrophied	.....	.....	Opaque	.....	.....	Muc. memb. thick and vascular	.....	.....	.....
531, 532	Man, 40	.....	.....	White and flat	Muc. memb. thick and white	.....	.....	White and flat	.....	.....	Muc. memb. thick and white	.....	.....	.....
535, 536	Woman, aet. 50	Committed suicide	.....	.....	Muc. memb. thick and red; adhesions between incus and inner wall of tympanum; stapes concealed	.....	.....	.....	.....	.....	Muc. memb. thick and red; adhesions between incus and inner wall of tympanum	.....	.....	Leb- rincine fluid hazy
547, 548	Man, 44	Consumption	Contains a collection of cerumen	Dull	Muc. memb. thick; contains mucus	.....	.....	.....	.....	.....	Muc. memb. thick and soft; malleus, incus, stapes, and promontory connected by adhesions	.....	.....	.....
555, 556	Man, 41 (slightly deaf)	Apoplexy	Partially calcareous	Partially calcareous

565, 566	Man, 36 (especially deaf in right ear)	Consumption	.....	.....	.....	.....	.....	.....	.....	.....
569, 570	Man, 60	Asthma	.....	.....	.....	.....	.....	.....	.....	.....
571, 572	Man, 28 (slightly deaf)	Apoplexy	.....	.....	.....	.....	.....	.....	.....	.....
575	Man (deaf in right ear only)	.....	.....	.....	.....	.....	.....	.....	.....	.....
589, 590	Man, 31 (deaf for many years)	.....	.....	.....	.....	.....	.....	.....	.....	.....
599, 600	Woman, 65 (deaf many years, especially right ear)	Paralysis	.....	.....	.....	.....	.....	.....	.....	.....
		

Adhesions between stapes and fenestra ovalis by partial ankylosis

Mucous labyrinth thickened

Laabyrinthine fluids much diminished

Adhesions between stapes and fenestra ovalis by firm ankylosis

Mucous membrane exceedingly thick; stapes entirely concealed; adhesions between stapes and fenestra ovalis more firm than natural

Mucous membrane thick and red

Thicker than natural; red at its circumference

Very concave and flabby; adherent to promontory

Mucous membrane much congested and thickened; contains mucus; adhesions between stapes, promontory and pyramid

Mucous membrane very thick; adhesions between incus and inner wall of tympanum

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Adhesions between stapes and fenestra ovalis by partial ankylosis

Mucous membrane very thick; adhesions between stapes and fenestra ovalis very firm

Mucous membrane thicker than natural

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Mucous membrane thick and vascular; adhesions between stapes, promontory, and pyramid

Adhesions between malleus, tensor tympani muscle, and stapes

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653, 664	Woman, æt. 21 (deafness came on after scarlet fever)	Erysipelas	White and thick; an orifice at the upper part	Muc. memb. thick and vascular	White and thick; orifice at the upper part	Muc. memb. thick and vascular
659, 660	Woman, æt. 60 (deafness came on very gradually)	Bronchitis	....	White and concave; adhesions between the ossicula and malleus projects adherent to promontory	Muc. memb. thick; adhesions between the ossicula and membrana tympani	White and concave; adhesions between the ossicula and membrana tympani	Muc. memb. thick; adhesions between the ossicula and membrana tympani
673	Man, 27 (slightly deaf in left ear)	Consumption	....	....	....	Connect- ed by large bands with promontory	Adhesions between the ossicula
675, 676	Woman, 26 (very deaf in right ear; slightly so in left; scarlet fever when a child)	Child- birth	....	Destroy- ed by ulceration	Muc. memb. thick, white, soft and ulcerated; bones disconnected	....	Muc. memb. thick; a false membrane covers the fenestra ovalis; adhesions between stapes and promontory
677, 678	Man, 60	Apoplexy	....	Opaque; inner layer thick	Muc. memb. thick; contains scrofulous matter; adhesions between stapes, incus, and inner wall of tympanum; partial anchylosis	Opaque & thicker than natural	Muc. memb. thick; adhesions between stapes, incus, and inner wall of tympanum; partial anchylosis

No. of the Dissections.	Sex, Age, &c.	Cause of Death.	RIGHT EAR.					LEFT EAR.						
			Meatus Externus.	Membrana Tympani.	Cavitas Tympani.	Eustachian Tube.	Internal Ear.	Meatus Externus.	Membrana Tympani.	Cavitas Tympani.	Eustachian Tube.	Internal Ear.		
679, 680	Woman, æt. 30	Consumption	....	White, concave, tense, & thick; adheres to the inner wall of tympanum	Adhesions between all the ossicula	....	....	....	Thick, concave, & tense; adherent to promontory	Adhesions between all the ossicula	....	....	....	Fluid in vestibule deficient in quantity
687, 688	Man, 40 (scrofulous when young)	Dropsy	....	White & thick; upper part gone; adherent to promontory	Adhesions between all the ossicula	....	....	Fluid in vestibule deficient in quantity	White and thick; adherent to promontory	Adhesions between all the ossicula	....	....	....	Fluid in vestibule deficient in quantity
707, 708	Child, 2½	Consumption	....	Destroyed by ulceration	Muc. memb. covered with scrofulous matter, and so thick as nearly to fill cavity of the tympanum	....	....	....	Thick, white, and soft	Muc. memb. very thick and red, and contains scrofulous matter	....	....	....	....
709, 710	Woman, æt. 40	Diseased uterus	....	White; thicker and more concave than natural	Muc. memb. thick and white; contains mucus	....	....	....	White, thick, & concave	Muc. memb. thick and white; adhesions between malleus, incus, and tympanum	....	....	....	....
713, 714	Man, 44 (had been growing deaf during many years)	Diseased bladder	Contains a collection of cerumen	White, shining & concave; adherent to incus	Muc. memb. thick; adhesions between stapes and promontory; partial ankylosis	....	....	....	....	Muc. memb. thick; adhesions between stapes and promontory; partial ankylosis	....	....	....	....

715, 716	Woman, æt. 48	Cancer of the liver	....	....	....	....	....	....	Muc. memb. thick; adhesions between stapes and promontory
719, 720	Youth, 17	Consumption	....	Thicker than natural	....	....	....	Soft and flabby; firmly adherent to promontory	Muc. memb. thick and red
721, 722	Girl, 8½	Measles	....	....	....	....	....	....	Muc. memb. very thick; tympanic cavity nearly filled by it
745, 746	....	Fever	....	Adherent to promontory by bands	....	....	....	Soft	Muc. memb. thick; full of mucus
753, 754	Woman, 73 (deaf in right ear from childhood, and latterly in the left)	Fever	....	Presents a large orifice; with the remaining portion thick and white	....	....	....	Opaque and thicker than natural	Muc. memb. thick
755, 756	Man, 60	Pneumonia	....	....	....	....	....	....	Muc. memb. very thick
757, 758	Man, 74 (slightly deaf)	Enteritis	....	Thick and opaque	....	....	....	Thicker than natural	Muc. memb. thick
761, 762	Woman, æt. 69	Dropsy	....	Whiter than natural	....	....	....	Thick and white	Muc. memb. thick; contains mucus

797, 798	Woman, 90 (dea. in left ear many years)	....	....	Muc. memb. thick; adhesions between stapes and promontory	....	....	....	Very con- cave	Adhesions between all the ossicula	Fluid of vestibule deficient
807, 808	Woman, Pneumonia æt. 26	....	....	Muc. memb. thick and red; contains mucus	....	....	....	Muc. memb. thick and red; contains mucus	Muc. memb. thick and soft	
809, 810	Woman, Rheumatism æt. 57	....	Opaque and thicker than natural	Muc. memb. thick and soft; contains offensive pus	....	....	....	White and thick		
815	Girl, 10 Diseased bone of the ear	....	Destroy- ed by ulceration	Muc. memb. ulcerated; bone carious	....	....	....
816, 817	Woman, Gangrena senilis æt. 79	....	Thick and very concave; adherent to promontory	Muc. memb. thick; incus partly absorbed; adhesions between stapes and promontory by anchylosis	....	Membranous labyrinth very thick	....	White; very thick and very concave; adherent to promontory	Muc. memb. very thick in parts; incus disjointed from stapes and partially absorbed; adhesions between stapes and promontory by anchylosis	Membranous labyrinth atrophied
832, 833	Man ....	....	White and very concave	Muc. memb. healthy; tensor tympani muscle atrophied	....	Membranous labyrinth atrophied	....	White and very concave	Muc. memb. healthy; tensor tympani muscles atrophied	Membranous labyrinth atrophied
844	Man (deaf in right ear only)	....	....	Muc. memb. very thick; full of tenacious mucus	....	....	....
847	Man, 45 (deaf in left ear only)	....	....	....	....	....	....	Destroy- ed by ulceration	Muc. memb. contains scrofulous matter	

No. of the Dissections.	Sex, Age, &c.	Cause of Death.	RIGHT EAR.				LEFT EAR.					
			Meatus Externus.	Membrana Tympani.	Cavitas Tympani.	Eustachian Tube.	Internal Ear.	Meatus Externus.	Membrana Tympani.	Cavitas Tympani.	Eustachian Tube.	Internal Ear.
855, 856	Man, 60	Dropsy	Full of cerumen and epithelium	White, thicker than natural and concave; adherent to promontory by bands	Muc. memb. very thick; stapes nearly concealed; incus absorbed	....	....	....	....	Muc. memb. thick and red; stapes partly concealed		
863, 864	Man, 73	Consumption	....	....	Muc. memb. very thick and soft	....	....	....	....	Muc. memb. very thick and soft		
867, 868	Man (deaf for four years)	Bronchitis	....	....	Muc. memb. thick and soft	....	....	....	....	Muc. memb. thick and soft		
877, 878	Woman, æt. 39	Consumption	....	Dull; inner layer white	Muc. memb. thick and soft; adhesions between stapes and promontory	....	There is a membranous band between the base of the stapes and the wall of the vestibule	....	....	Muc. memb. thick		
879, 880	Woman, æt. 50	Consumption	....	....	Muc. memb. thick; adhesions between stapes and promontory by partial anchylosis	....	....	White	....	Muc. memb. very thick; covered with mucus; adhesions between stapes and promontory by partial anchylosis		

DISEASES OF THE EAR.

881, 882	Man, 50	Apoplexy	.....	Muc. memb. thick	.....	Muc. memb. thick
887	Young man, 17 (deaf in right ear only)	.....	.....	Destroy- ed by ul- ceration	.....	.....
907	Man, 45 (deaf in right ear)	Opaque
910, 911	Man, 40	Thick and white
912, 913	Man, 30

Muc. memb. thick

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Muc. memb. thick

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Full of
pus; au-
ditory
nerve
thick, and
red, and
hard

Muc. memb. thick;
full of dark pus;
stapes gone

Muc. memb. thick;
the ossicula con-
nected by very
firm adhesions

Muc. memb. very
thick; covered
with dark mucus;
adhesions between
ossicula, and con-
cealing them

Muc. memb. thick;
covered with pus

Muc. memb. thick
and white; con-
tains mucus; nu-
merous strong ad-
hesions between
the ossicula

White
and part-
ly ab-
sorbed
cerumen

.....

.....

Contains
a collec-
tion of
cerumen

.....

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Muc. memb. thick
and dark coloured;
stapes nearly con-
cealed and firmly
fixed in the fenest-
ra ovalis

Ulcerat-
ed; pre-
sents a
large ori-
fice

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Muc. memb. thick;
covered with pus

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TABLE II.—CASES OF DISEASE AND PROBABLE DEAFNESS.

No. of the Dissections.	Sex, Age, &c.	Cause of Death.	RIGHT EAR.				LEFT EAR.						
			Meatus Externus.	Membrana Tympani.	Cavitas Tympani.	Eustachian Tube.	Internal Ear.	Meatus Externus.	Membrana Tympani.	Cavitas Tympani.	Eustachian Tube.	Internal Ear.	
34	Adult	Delirium tremens	Contains offensive pus	Ulcerated. An orifice Hazy	Mucous membrane covered with thick pus								
68, 69	Young woman	Tuberculous disease	.....		Muc. memb. very thick; stapes nearly concealed; contains mucus; adhesions between malleus and promontory	Mucous memb. thick; stapes mem. congested	.....	.....	.....	Muc. memb. thick; adhesions between stapes and promontory			
78, 79	Woman, æt. 45	Burn over head and face	Vascular	Concave, shrivelled and dry; stapes projects through it	Muc. memb. red and thick; full of serum and lymph	.....	.....	.....	.....	Concave and white; an orifice, the edges of which adhere to the promontory	Muc. memb. thick and vascular	Red and soft	
109, 110	Man, 50	Effusion on brain	.....	.....	Muc. memb. thick and soft; contains serum	.....	.....	.....	.....	.....	Very strong and numerous adhesions between the membrana tympani and ossicula		
115, 116	Man, 40	Consumption	Full of cerumen	.....	Muc. memb. thick and vascular; adhesions between incus and memb. tympani, stapes and promontory	.....	.....	.....	.....	.....	.....	Adhesions between memb. tympani, incus, stapes, and promontory	

117, 118	Man, 22	Epilepsy	....	....	....	Vascular	Vascular; presents an orifice	Muc. memb. very red; adhesions between memb. tympani and stapes
125*, 126*	Man, 24	Fever	....	....	....	....	....	Muc. memb. thick and vascular; contains mucus; adhesions between memb. tympani, malleus, and promontory
130	Man, 40	Bright's disease	....	....	....	....	Thin, drawn inwards, and adheres to promontory	Muc. memb. thick; the long process of incus absorbed
131, 132	Child, 10	Consumption	....	....	....	....	Destroyed by ulceration	Muc. memb. thick and pulpy; adhesions between stapes and promontory
144, 145	Woman, aet. 60	Paralysis	....	....	....	....	An orifice nearly a lineimeter; adheres to promontory	Adhesions between stapes and promontory
154	Child, 6	Cholera	....	....	....	....	Mucous membrane very vascular, and so thick as to bury the stapes in it	Adhesions between stapes and promontory

197	Man, 63	Consumption	Contains cerumen	Connected with stapes	Muc. memb. thick and opaque; adhesions between stapes and promontory	....	....	....	Muc. memb. very thick and vascular
209, 210	Man, 28	Fever; ill two days	....	Hazy	Muc. memb. thick and very vascular; contains serum and pus	....	....	....	....
211	Man, 63	Fever; ill six weeks	Contains hard cerumen in contact with memb. tymp.	Dull	Muc. memb. thick and vascular; contains serum and pus	....	....	....	....
272	Woman, aet. 65	Inflammation of lungs	....	....	....	....	....	....	Presents a large orifice at its centre; malleus and incus absent
275, 276	Man, 64	Asthma	....	....	Adhesions between the base of the stapes and the fenestra ovalis by ankylosis	....	....	....	Adhesions between the base of the stapes and the fenestra ovalis by ankylosis
323	Man, 23	Consumption	....	Opaque	Muc. memb. very thick; stapes concealed; adhesions between stapes and promontory	....	....	....	....
359, 360	Woman, aet. 17	Scarlet fever	Tumefied and vascular	Thick, soft, vascular; very concave	Mucous memb. red, soft, and thick	....	....	....	Soft and vascular lymph effused

723, 724	Infant, 9 months	Measles	....	White and soft; vessels large and numerous	Muc. memb. red, soft; contains blood and mucus; adhesions between malleus, incus, and inner wall of tympanum	....	....	Ulcerated; a large orifice at the posterior part	Muc. memb. thick and ulcerated; incus disconnected
728	Girl, 9	Diseased hip	....	....	....	....	....	Destroyed by ulceration	Muc. memb. ulcerated and very thick; contains scrofulous matter
729, 730	Child, æt. 18 mths.	Measles	....	Red	Muc. memb. thick; contains mucopurulent matter	....	....	Red	Muc. memb. thick, red, and soft; contains mucopurulent matter
745, 746	Boy, 3	Scarlatina	....	Thick and red	Muc. memb. very thick, so as nearly to fill the cavity of the tympanum	....	....	Thick and red	Muc. memb. very thick, nearly filling the tympanum
771	Man, 75	Pneumonia	....	....	Muc. memb. contains a large quantity of mucus	....	....	....	....
813	Woman, æt. 35	Consumption	....	....	Muc. memb. soft and thick; contains viscid mucus	....	....	....	....
859, 860	Woman, æt. 71	Consumption	....	Connected with promontory	Muc. memb. thick	....	....	Connected with promontory	Muc. memb. thick
861, 862	Woman, æt. 34	Apoplexy	....	Connected with inner wall of tympanum	Muc. memb. thick; adhesions between stapes and promontory	....	....	Connected with inner wall of tympanum	Muc. memb. thick; adhesions between stapes and promontory

TABLE III.—CASES OF INCIPIENT DEAFNESS, 358.

Meatus Externus .	{	Having a collection of cerumen	28		
		" " and epithelium	5		
		" " and rye seeds	2		
		" " epithelium only	1		
Membrana Tympani	{	Thick and vascular	3		
		Very concave externally	4		
		Thick and whiter than natural	11		
		Connected with promontory by adhesions	16		
		" stapes by adhesions	5		
		" stapes and promontory by adhesions	1		
		" stapes and chorda tympani	1		
		" incus	6		
		" all the ossicles and the promontory	3		
Cavitas Tympani	{	Contents	Mucus: the membrane being healthy	13	
			Mucus: the membrane being thick	5	
			Serum: the membrane being vascular	4	
			Blood	2	
			Calcareous matter	5	
			Scrofulous matter	6	
			Serum and lymph	1	
		Purulent matter	1		
		State of Mucous Membrane	{	More vascular than natural	28
				Thicker than natural	71
Ulcerated	2				
Flocculent	1				
Black pigment secreted beneath it	2				
		Effusion of blood beneath it	8		
		" serum " 	1		
Adhesions between	{	Malleus and stapes	1		
		" and promontory	4		
		Malleus and promontory	5		
		Incus and promontory	1		
		Incus, stapes, and promontory	3		
		Incus, tensor tympani muscle, and promontory	1		
		Stapes and promontory: mucous membrane healthy	66		
		" " " vascular	6		
		" " " thick	30		
		Stapes and tensor tympani muscle	3		
		Chorda tympani nerve and incus	1		
		" " incus, stapes, and promontory	2		
		" " and upper wall of tympanic cavity	1		
		All the ossicula and the promontory	5		
		Fenestra Rotunda	{	Bands of adhesion over the fenestra rotunda concealing the membrane	3
Eustachian Tube	{	Containing mucus	8		
		Lining membrane thick and vascular	3		
		Bands of adhesion connecting the parietes	3		

TABLE IV.
TABULAR ABSTRACT OF THE CONDITION OF THE 612
DISEASED EARS.

		Cases of Deafness, 184.	Cases of Probable Deafness, 70.	Cases of Incipient Deafness, 358.
Meatus Externus	Containing a collection of cerum	16 or $\frac{1}{11}$	4 or $\frac{1}{17}$	28 or $\frac{1}{13}$
	" and epithelium " of cerum	1	—	5
	Containing a collection of cerum and rye-seeds	—	—	2
	Containing a collection of epithe- lium	1	—	1
	Containing a collection of pus	9	1	—
	" of pus and epithelium	3	—	—
	Membrane thick	2	—	—
	" atrophied	1	—	—
	" vascular	—	4	—
	Osseous walls carious	2	—	—
	" canal contracted	2	—	—
	Membrana Tympani	White, and thicker than natural	30 or $\frac{1}{8}$	4 or $\frac{1}{17}$	11 or $\frac{1}{32}$
Very concave externally		7 or $\frac{1}{25}$	3 or $\frac{1}{23}$	4 or $\frac{1}{25}$
Flat		1	—	—
Vascular		4	—	—
Thick and vascular		—	—	3
Contains a deposit of calcareous matter		4	—	—
Presents an orifice		12	—	—
One half destroyed by ulceration		4	—	—
Three fourths " "		13	—	—
All " "		12	—	—
Very concave and adherent to promontory		15	6	—
Connected with promontory by bands		11 or $\frac{1}{4}$	9 or $\frac{1}{8}$	16 or $\frac{1}{32}$
Adherent to stapes		—	3	—
Connected with stapes by bands		2	—	5
Has an orifice through which the stapes projects		—	1	—
Nearly destroyed; the remnant adherent to promontory		9 or $\frac{1}{20}$	—	—
Connected with the stapes and promontory by bands		3	—	1
Connected with incus by bands		1	—	—
Adherent to incus		—	1	6
Connected with all the ossicula by bands		1	1	—
Connected with all the ossicula and the promontory by bands	—	3	3	

		Cases of Deafness.	Cases of Probable Deafness.	Cases of Incipient Deafness.		
Cavitas Tympani	Contents	A collection of mucus: the membrane healthy	19 or $\frac{1}{2}$	11 or $\frac{1}{2}$	13 or $\frac{1}{2}$	
		A collection of mucus: the membrane thick	—	—	5	
		A collection of cerumen	1	—	—	
		„ epithelium	1	—	—	
		„ pus: muc. memb. thick	15	—	—	
		„ blood	1	1	2	
		„ lymph	1	1	1	
		„ serum and lymph	—	—	1	
		„ serum	—	5	4	
		„ scrofulous matter	11	3	6	
		„ oily matter	1	—	—	
		„ calcareous matter	2	—	5	
		State of Mucous Membrane	More vascular than natural	17 or $\frac{1}{10}$	21 or $\frac{1}{3}$	28 or $\frac{1}{3}$
			Thicker than natural	73 or $\frac{1}{2}$	35 or $\frac{1}{2}$	71 or $\frac{1}{2}$
			So thick as almost to bury the whole of the stapes	8	14	—
			„ „ to fill the tympanum	5	3	—
			Ulcerated and thick	12	6	2
			Pulpy	—	4	1
Black pigment secreted beneath it	—		—	2		
Effusion of blood beneath it	—		—	8		
„ serum beneath it	—		—	1		
Bands of adhesion between	Stapes and promontory: muc. memb. healthy		—	9	66	
	Stapes and promontory: muc. memb. thick	18	—	30		
	Stapes and promontory: muc. memb. vascular	—	—	6		
	Stapes, promontory, and pyramid	1	—	—		
	Incus and promontory	4	—	1		
	Incus, stapes, and promontory	—	—	3		
	Malleus and promontory	3	3	—		
	„ and stapes	—	—	1		
	„ stapes, and promontory	—	1	4		
	All the ossicles	13	—	—		
	„ and the promontory	3	1	5		
	Tensor tympani muscle and stapes	—	—	3		
	Chorda tympani nerve and incus	—	—	1		
State of the Ossicula	Malleus					
	Adherent to promontory	1	—	—		
	Removed by absorption	1	—	—		
	„ ulceration	3	1	—		
	Partly destroyed by caries and incus in mastoid cells	1	—	—		

		Cases of Deafness.	Cases of Probable Deafness.	Cases of Incipient Deafness.		
<i>Cavitas Tympani (continued)</i>	State of the Ossicula (<i>continued</i>)	Incus	Removed by absorption	3	—	—
			" ulceration	—	1	—
			Partially absorbed	4	1	—
			Partially removed by caries	1	—	—
			Disconnected from stapes	1	1	—
		Disconnected from stapes and malleus	—	1	—	
		Stapes	The base anchylosed to the fenestra ovalis	14	2	—
			" partially do. do.	10	—	—
			" attached to fenestra ovalis more firmly than natural	3	1	—
			" absorbed	1	—	—
	" disconnected from fenestra ovalis		—	1	—	
	All the Ossicula	Crura absorbed	1	—	—	
		Base projecting into the vestibule	1	—	—	
		Disappeared from ulceration	2	—	—	
		Removed by ulceration	2	—	—	
			Disconnected	1	—	—
	2			—	—	
	Osseous Walls of Tympanum	Carious	Thickened	1	—	—
			Carious	2	—	—
			Upper wall partially deficient	10	12	32
Lower wall " "			5	4	13	
Carotid canal contracted			3	—	—	
Membrane of Fenestra rotunda	Red and pulpy	1	—	—		
		Bands of adhesion covering it	1	—	3	
Tensor tympani Muscle	Atrophied	6	1	—		
		Attached to stapes	1	—	—	
Eustachian Tube	Contains mucus	2	—	8		
		" lining memb. vascular	1	—	—	
		" lining memb. thick	2	—	—	
		Lining membrane congested	—	2	3	
		Bands of adhesion connecting the parietes	—	—	3	
Internal Ear	Membranous labyrinth thickened	4	—	—		
		" " atrophied	6	—	—	
		Labyrinthine fluids deficient	8	—	—	
		Vestibule and cochlea contain bloody serum	1	—	—	
		" full of pus	1	—	—	
A membranous band extending across the vestibule	1	—	—			