Short abstract of the diagnosis, prognosis, and treatment of the diseases of the ear / by William Kramer.

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SHORT ABSTRACT

OF THE

DIAGNOSIS, PROGNOSIS, AND TREATMENT

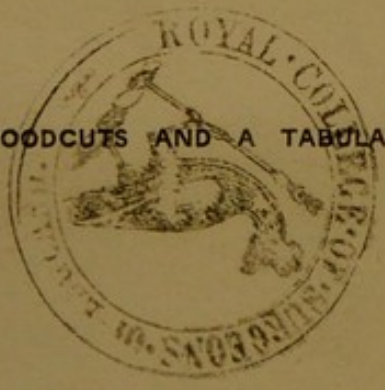
OF

E DISEASES OF THE EAR.

BY

WILLIAM KRAMER, M.D.

(FROM BERLIN, PRUSSIA)



WITH TWO WOODCUTS AND A TABULAR VIEW.

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TO

SIR CHARLES LOCOCK, BART., M.D.

&c. &c. &c.

IN ACKNOWLEDGEMENT OF HIS FRIENDSHIP.

In the following few pages is laid before the English Profession a very short but essential abstract of the Author's views on, and principles of, the Diagnosis, Prognosis, and Treatment of the Diseases of the Ear. On comparing them with the Author's 'Diagnosis and Treatment of the Diseases of the Ear' (London : Longman & Co., 1837), nobody will refuse to admit that they are much modified, and, he hopes, much improved too. He trusts they may be kindly received, and refers, for further information, to his 'Aural Medicine of our Times' (Berlin, 1861).

The Author.

62 *Russell Square.*

IN diagnosing the diseases of the Ear, the choice between subjective or objective symptoms cannot be more doubtful than in any other branch of medical science. The *objective* symptoms are the only ones to be relied upon: they deserve, indeed, to be known most exactly—to be used most extensively. They are, *optic*, *acoustic*, and *tactile*.

The optic symptoms are sufficient for establishing the diagnosis of the diseases of the external ear, save very rare cases of caries of the auditory passage, to be ascertained in their extent, &c., by the aid of tactile means of investigation.

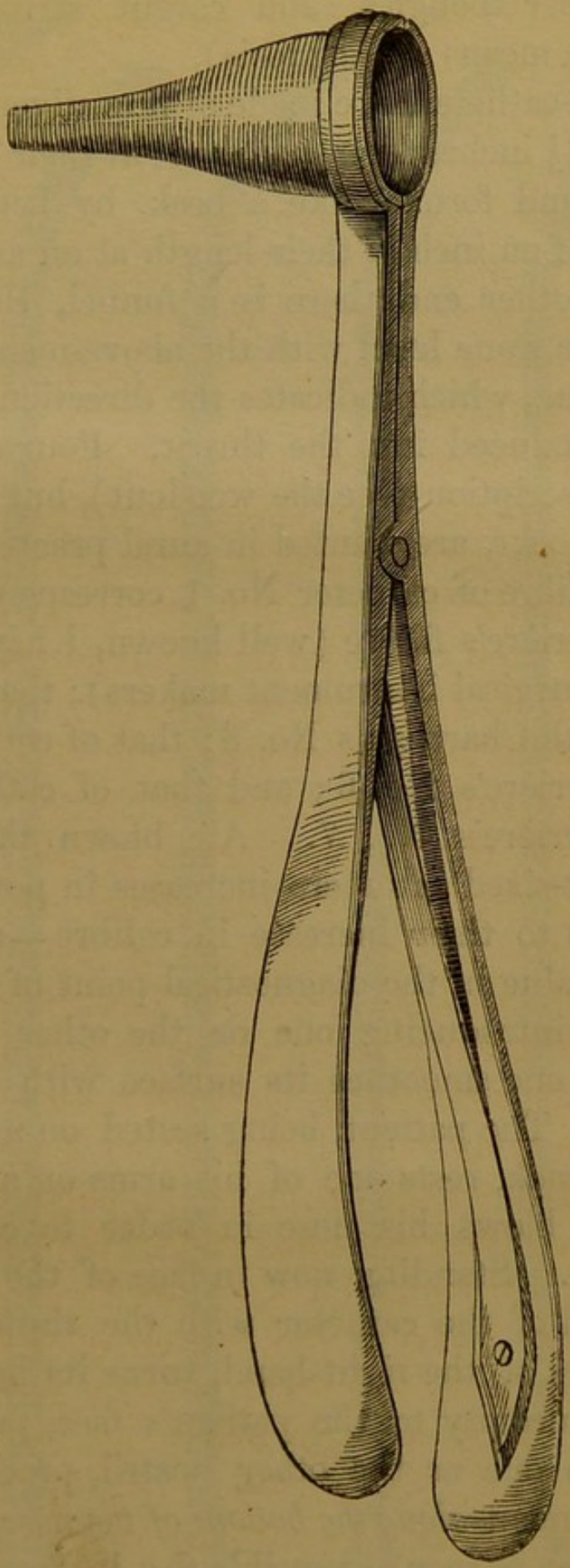
The diseases of the middle ear (the membrane of the drum being *imperforated*) are unfortunately quite inaccessible to the optical means of diagnosis; the inspection of the guttural mouth of the Eustachian tube, lately performed, being indeed as little of value in this respect as the inspection of the throat most commonly contributes to enlighten the diagnosis of the diseases of the middle ear. To say the truth, this diagnosis depends on *acoustic* and *tactile* means of examination only, the results of which are not less trustworthy than those obtained by the application of the stethoscope to the exploration of the diseases of the lungs and heart.

The ocular inspection of the auditory passage, and

of the membrane of the drum, can be made most successfully by the aid of my *ear-speculum* (first published in 1833—see the woodcut). It consists of a singly-slit metallic funnel, 1 inch 8 lines long; at its upper opening, 8 lines wide; at the bottom, 2 lines wide; its lower nearly cylindrical, part being 7 lines long, its inner surface blunt, not polished; the funnel's halves join at a right angle to two branches 6 inches long, fitted so as to open the funnel by a slight pressure of the hand.

The patient being seated on a chair close by a well-lighted window, one draws his ear strongly upwards and backwards with the left hand, in order to open the auditory passage as much as possible, and puts most gently, with the right hand, the closed funnel of the ear-speculum, by a few lines, into the auditory passage. By pressing the handles of the instrument very softly, it opens widely enough to give full access to broad daylight, or rather to the rays of the sun, by means of which one can survey completely, and at *one glance*, the auditory passage and the whole membrane of the drum. *No artificial light can make up for sunshine*, if *any morbid alteration* has taken place in the parts just mentioned. If one suspects caries in the auditory passage or in the cavity of the tympanum, laid open by the perforation of the membrane of the drum, or if a polypous growth fills up the auditory passage, one introduces (in the former cases through the ear-speculum) a slender buttoned silver probe to the bottom of the auditory passage, in order to discover the seat and extent of the carious bone, and the root of the polypous growth.

The middle ear can be examined very satisfactorily by my suit of four ear-catheters, my diagnostical tube

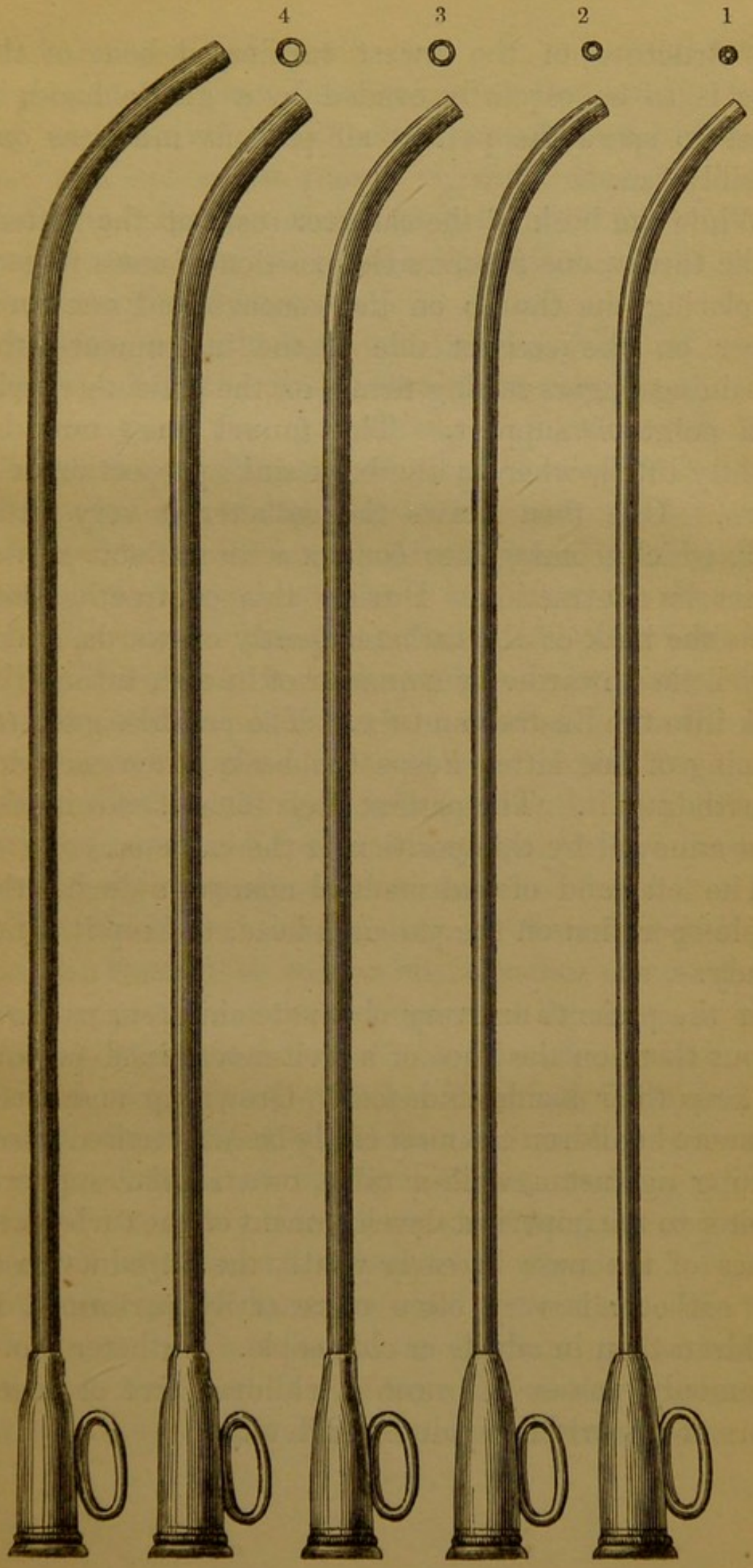


india-rubber bougies, and catgut strings (*acoustic* and *tactile* means of diagnosis).

My ear-catheters are made of fine silver, cylindrical, straight, $6\frac{1}{3}$ inches long, polished; at their one end well rounded and formed like a beak, by bending three-quarters of an inch of their length at an angle of 144°. At their other end there is a funnel, 10 lines long, and on the same level with the above-mentioned beak, an oval ring, which indicates the direction of this beak when introduced into the throat. Four ear-catheters of this description (see the woodcut), but of *gradually increasing size*, are wanted in aural practice.

The calibre of catheter No. 1 corresponds with No. 1 of Charrière's filière (well known, I have no doubt, to all chirurgical instrument makers); that of catheter No. 2, with Charrière's No. 3; that of catheter No. 3, with Charrière's No. 6; and that of catheter No. 4, with Charrière's No. 7. Air blown through these differently-sized catheters increases in power in exact proportion to their increase in calibre—a fact of the greatest value in the diagnostical point of view.

Before introducing one or the other of my ear-catheters, one smoothes its surface with one drop of olive oil. The patient, being seated on a chair, leans properly back, rests one of his arms on a table at his side, and blows his nose in order to clean and to moisten it. Standing now in face of the patient, one takes hold of the catheter with the thumb and two fore-fingers of the right hand, turns its beak upwards and its concavity to the patient's face, puts the beak *gently* into one or the other nostril, proceeding with the instrument *along the bottom of the nose*, and raising the catheter as soon as possible to a horizontal position, till its beak touches the throat. Any irregularity in


4
3
2
1

the structure of the lowest turbinated bone of the nose is to be carefully evaded by a gentle hand, in order to spare the patient all pain as much as one possibly can.

While the beak of the catheter rests at the bottom of the throat, one reverses the position of one's fingers by placing the thumb on the concave and one fore-finger on the convex side of the instrument—the remaining fingers resting firmly on the patient's cheek, as a point of support. The funnel must now be slightly lifted, whereby the beak sinks proportionately down. One then draws the catheter a very little back, which, coming into contact with the soft palate, causes its contraction. During this contraction, one turns the beak of the catheter gently outwards, and a very little upwards, by a quarter of its axe, lifting the beak into the Eustachian tube. The pad-like guttural opening of this latter keeps the beak, when one tries to withdraw it. The patient feels himself not in the least annoyed by this position of the catheter.

The left hand of the medical man rests during the whole operation on the patient's head, to keep it quite steady.

If the patients are very obstinate children, we have to put them on the knee of a well-determined person, to keep their hands and feet. Grown-up and well-mannered children can most easily be catheterised when leaning against a wall, a table, or a similar support. Owing to the imperfect developement of the turbinated bones of the nose in early youth, the introduction of the catheter is very often more easily performed in children than in adults or old people. Catheter No. 3 commonly passes the nose of children five or seven years of age without pain or difficulty.

In all cases, and in all respects, it is very advisable to use, on the first examination of the middle ear of any patient, catheter No. 3, as a well-sized and large one, well apt to let pass a vigorous stream of air, blown in. If this catheter happens to be too large to pass the nose, one has recourse to catheter No. 2, or 1 if necessary, and inverse.

On blowing through one or the other of these catheters into the Eustachian tube, eventually into the cavity of the tympanum, various sounds are created, the peculiarities of which are easily discernible by the aid of my diagnostical tube. This very valuable instrument is made of vulcanised india-rubber, about 2 feet long and 3 lines in diameter. One end being introduced into the patient's, the other into the medical man's ear, it conducts all sounds generated in the former's ear directly, and unaltered, to the observer's ear and perception. One is in this way quite independent of the patient's subjective and mostly very indistinct and confused impressions and perceptions in this deep-seated part of the ear.

The air, blown through one or the other catheter into the Eustachian tube, either reaches the cavity of the tympanum and the membrane of the drum, or not, owing to imperviousness of the Eustachian tube. In the first case, the sound of the air-current is conducted through the india-rubber tube into the observer's ear as if air were blown *directly* into it, and not by a long roundabout way. This impression is quite independent of any organic alteration whatever of the membrane of the drum, save its perforation. In the second case, the sounds generated in the patient's ear, and not reaching the membrane of the drum, are perceived as being more or less distant from the

observer's ear, according to the *impervious* part of the Eustachian tube being more or less far from the cavity of the tympanum.

In order to watch better these sounds, one blows into the catheter in a *long-protracted*, soft, and gradually increasing manner. The sounds thus created are either *gradually increasing* and *long protracted*, or *short* and *interrupted*, according to the perfectly or imperfectly pervious state of the Eustachian tube. They are *sonorous* or *dull*, *dry* or *moist*, in very different degrees, according to the varying organic condition of the walls of the middle ear, and in proportion to deficiency or abundance of secretion on the surface of the membrane, lining the middle ear.

If the Eustachian tube is completely pervious, in a normal state, air, blown into it through my catheter No. 1, rushes (apparently) directly to the observer's ear, in the shape of a broad and long uninterrupted current. The more imperfectly this takes place, and the more it is necessary to have, gradually, recourse to the Nos. 2, 3, or 4 of my catheters in order to force at length the current of air directly through the patient's ear, the less pervious is the Eustachian tube and the cavity of the tympanum, either by organic alterations of their lining membrane, or by accumulation of any morbid secretion. In this way my four ear-catheters are most apt to measure different degrees of narrowness, or imperviousness of the middle ear.

For the purpose of ascertaining exactly the spot, the degree, and the extent of any narrowness of the Eustachian tube, I make use of india-rubber bougies (the smallest one-third of a millimètre at the point) or of catgut strings (the smallest measuring in

diameter one-fifth of a millimètre), after marking on them—

1. The length of the catheter;
2. (Reckoning backwards) The length of the cartilaginous part of the Eustachian tube, 1 inch;
3. The length of its osseous part, ½ inch; and
4. The diameter of the cavity of the drum, ½ inch more.

Bougies or catgut strings, thus prepared and pushed to the point of the catheter's beak, are carried slowly and gently into the Eustachian tube. Where in this way one meets an obstacle not to be surpassed without pain, the narrowed part of the Eustachian tube is found out — its distance from the mouth of the Eustachian tube is easily to be measured by the marks on the bougies or catgut strings. If these instruments are small enough to be pushed through such strictures without pain, the resistance met with on overcoming these latter adds to calculate their tightness and extent. Occasionally there are second strictures behind the first ones. Generally speaking, strictures of the Eustachian tube are most frequently situated at a distance of one inch from its guttural entrance—that is to say, at the end of its cartilaginous part.

By the aid of these different means of investigation, one ascertains in the middle ear, the membrane of the drum being imperforated, the existence of four different morbid alterations of its lining membrane:—

1. A complete want of submucous free exudation;
2. An abundant free exudation;
3. An abundant, free, *and* submucous exudation;
4. A more or less large submucous exudation only.

For the better acknowledgement of the influence of these morbid alterations of the lining membrane of the

middle ear, and of its secretion on the developement of deafness, I have to dwell on the passage of sounds through the middle ear to the auditory nerve.

One usually thinks that sounds are being conducted through the ossicles and the fenestra ovalis to the labyrinth. This opinion is wrong, according to the following facts, in which, the auditory passage and membrane of the drum looking quite healthy, the sonorous vibrations reach, of course, the membrane of the drum, and the malleus of the handle, perfectly freely:—

1. In many cases of deafness, on blowing through one or the other catheter into the Eustachian tube, the air passes through the middle ear with a mucous rattling sound, relieving instantly the deafness in a very striking manner. This improvement increases from day to day, in proportion to the further diminution of the mucous rattling sound of the air blown into the cavity of the drum, till it proves a quite pure and soft one. Deafness is, indeed, blown away in such cases; it is cured by nothing but blowing. Therefore, its cause must be movable; that is to say, a collection of some fluid or other in the middle ear. This fluid is blown out, though not visibly, by a long-continued stream of air, turning back in the cavity of the drum to the throat.

As the condition of the ossicles, which are solid and tightly connected with each other, is not being altered by blowing into the cavity of the tympanum, the cause of the deafness just described cannot be an interrupted passage of sounds through the ossicles. Just as little the supposed capacity of them for being conductors of sounds could be lessened by their being wrapped up

in mucous matter, interrupting the passage of sounds on their surface; everybody knows that sounds, reaching solid bodies, are not conducted on their surface, but through their very substance.

Mucous matter or any other fluid, collected in the middle ear, removes the air it contains. Deafness then never fails to make its appearance, and lasts always as long as the middle ear is filled up. Blowing into the middle ear removes the morbid fluid matter it contains, to make room again for the atmospheric air which originally occupied it. Cure of deafness is the result of this change of things in the middle ear; in other words, the removal of a *good* conductor of sounds (atmospheric air) out of the middle ear, originates deafness—its re-establishment in the same locality, cures deafness. Hence, I think there is no doubt that sounds reaching the membrane of the drum pass through the air of the cavity of the tympanum, the membrane of the fenestra rotunda, and touch finally the auditory nerve, embedded in the labyrinth.

2. Many other cases of deafness are immediately relieved, if one succeeds, by blowing through No. 4 or 3 of my catheters, to force air through strictures of the Eustachian tubes, combined with free exudation in the cavity of the drum. Air in these cases does not pass in a long current, as in the cases just described, but in small short bubbles, into the cavity of the drum, which is filled up with more or less mucous matter, not removable by any effort of blowing, because the strictures of the Eustachian tube close again after the air bubbles are forced into the cavity of the tympanum. Hence in these cases the catheterisation of the Eustachian tube does undoubtedly re-establish just as little the

intercepted balance of air on both sides of the membrane of the drum, as this intercepted balance can be the cause of the accompanying deafness. Its cause must be movable—an accumulation in the cavity of the drum of mucous matter, removed not out of this cavity, but only from a certain spot which must be particularly important for the transmission of sonorous vibrations to the labyrinth. This spot is most likely, and according to the above explanations, not the surface of the ossicles, but the membrane of the fenestra rotunda, this being the part of the bottom of the cavity of the drum, which there is more pervious to sonorous vibrations than any other one.

3. In other cases of deafness, again, air blown through catheter No. 1 enters the cavity of the drum in a large and uninterrupted current, with a sharp dry sound. The Eustachian tube is therefore perfectly free; no interruption of the necessary balance of air on both sides of the membrane of the drum does exist. There is, moreover, a complete want of secretion of the membrane lining the cavity of the tympanum, including the membrane of the fenestra rotunda. If one succeeds in these cases in re-establishing the natural secretion of the middle ear, one never fails to relieve the accompanying deafness—a fact, which is best to be explained by supposing that the membrane of the fenestra rotunda, now again moistened and restored to its natural condition, is more apt than before to vibrate properly in order to conduct sounds to the labyrinth.

These pathological facts are, finally, much supported by the acoustic law, that tense membranes, when touched by a solid body at any part of their surface, do not vibrate at all. Hence the membrane

of the drum, being divided into two unequal halves by its close connection with the handle of the malleus, does, as a whole, not vibrate at all. Furthermore, there is no doubt that vibrations of tense membranes are but faintly communicated to their solid boundaries. Hence, again, the larger half of the membrane of the drum is most likely its only part apt to vibrate and to communicate its vibrations, not to the handle of the malleus, but to the air in the cavity of the drum, and, in progressing farther, to the membrane of the fenestra rotunda, situated opposite to this larger half of the membrane of the drum.

Thus, the condition of the membrane of the fenestra rotunda is of great importance in the developement of all cases of deafness, resulting from affections of the middle ear, the membrane of the drum and the auditory passage being healthy. On the other side, the value of the ossicles, as conductors of sonorous vibrations, and likewise the importance of all morbid conditions of these ossicles, as sharing in the developement of deafness, is exceedingly small, if any.

The *tabular view* of 1,000 cases of diseases of the ear, here added as a small part of my practical experience since 1830, shows how important it is to examine closely the different morbid alterations of the constituent parts of the organ of hearing, by the objective means of investigation mentioned above. If they are neglected, not even the most minute history of any case of deafness can make up for it.

According to my tabular view, catarrhal inflammations of the middle ear, the membrane of the drum being imperforated, are the most frequent diseases of the ear (558 out of 1,000 cases); and amongst them, again, submucous exudations (407 out of 558 cases),

TABULAR VIEW OF ONE THOUSAND CASES OF DISEASES OF THE EAR.

DISEASES OF THE EXTERNAL EAR	Diseases of the Cartilage	Inflammation of the Dermis	Acute	1			
			Chronic	1	1		
		Inflammation of the cellular tissue		1			
		Inflammation of the cartilaginous tissue		...	3		
	Diseases of the Auditory Passage	Inflammatory irritation of the ceruminous glands		163	206		
		Inflammation of the dermis		22			
		Inflammation of the cellular tissue		18			
		Inflammation of the periosteum		3			
	Diseases of the Membrane of the Drum	Inflammation of the Membrane of the Drum	Acute	35	218	427	1,000 cases
			Chronic	Simple	64		
				With perforation	87		
				With polypous growth	29		
				With both of them	3		
DISEASES OF THE MIDDLE EAR	Catarrhal Inflammation of the Mucous Membrane	Without any exudation		9	560	573	
		With free exudation only		34			
		With free and submucous exudation		108			
		With submucous exudation only		407			
	Otalgia			1	13		
	Noise in the ear without deafness			1			
DISEASES OF THE INTERNAL EAR	Acute inflammation			...	9		
	Chronic inflammation			...			
	Nervous deafness			4			
	Deaf and dumbness		acquired	7			
			inborn	2			

with thickening and swelling of the lining membrane of the middle ear, including the membrane of the fenestra rotunda.

I. Diseases of the External Ear.

1. *Diseases of the Auricle.*

a. *Inflammation of the Dermis.*

α. *Acute Form.*

Diagnosis.—Together with much fever, a hot, dark-red, tense, shining, very painful swelling of the auricle appears, extends slowly and gradually over the face and the head to the other ear, closing both auditory passages, with more or less deafness. All inflammatory symptoms disappear within nine days by desquamation of the affected parts.

Prognosis.—Very favourable indeed; but the inflammation neglected, or badly treated, is liable to extend dangerously to the membranes of the brain.

Treatment.—Due attendance of the fever, according to its character. The patient has to remain in bed, or, in milder cases, at least in-doors; topically, nothing is to be done but to protect the ears against cold and moisture.

β. *Chronic Form.*

Diagnosis.—Without any fever appears on one or on both auricles, a slowly increasing and more or less red swelling, covered, or with pustules and crusts of different thickness and extent, narrowing or closing entirely the auditory passage, with considerable deafness; or with easily bleeding, very painful fissures and crevices, which are often changed into ichorous,

destroying suppuration, leprous thickening and degeneration of the auricle, closing again the auditory passage and generating deafness.

Prognosis.—Most unfavourable; and the more so the older the disease and the patient himself are, and the more worn out and broken down his constitution in general is.

Treatment.—Make use of antidyscrasial remedies; and of those, small doses of the Solutio arsenicalis Fowleri are the most effectual. After daily cleaning the discharging ear, apply topically a mild solution of sulphate of zinc.

b. *Inflammation of the Cellular Tissue.*

Diagnosis.—A small, painfully tense swelling appears very suddenly on the anterior surface of the auricle, filling within a few days with purulent matter, and ready to discharge when suitably assisted.

Prognosis.—Very favourable.

Treatment.—Hot linseed-meal poultices applied to the swelling, till it opens.

c. *Inflammation of the Membrane of the Cartilage.*

Diagnosis.—A swelling, frequently the size of a hen's egg, little or not at all painful, arises slowly on the front surface of the auricle (mostly of the left ear), from the very beginning fluctuating perceptibly, but without opening of itself. If opened by incision, blood flows out; the same swelling forms very soon again and again, which ought to be emptied again and again by cutting in largely. In the emptied blood-pouch at length new cartilages are formed, which unite with the old cartilage, and disfigure very much the ear.

Prognosis.—Most unfavourable.

Treatment.—Refreshing general and local remedies are very rarely suitable, but most frequently such as tend to strengthen, to corroborate and enliven the patient and the diseased ear: for instance, cordials, aromatic, vinous, warm applications, &c. They are the more of urgent necessity, the more the patients usually are melancholics and idiots.

2. *Diseases of the Auditory Passage.*

a. *Inflammatory Irritation of the Ceruminous Glands.*

Diagnosis.—On exploring the auditory passage by the aid of my ear-speculum, one finds it closed by a more or less large accumulation of dark-coloured and more or less hardened ear-wax.

Prognosis.—Very favourable.

Treatment.—Soften the hardened ear-wax by olive oil poured into the ear, and remove the ear-wax by lukewarm water injected by an india-rubber syringe, the size of a man's hand.

b. *Inflammation of the Dermis.*

Diagnosis.—Itching, burning, tearing pains in one or both ears, with pinkish, spongy, granular, or smooth swelling of the auditory passage, which is considerably narrowed and abounds in sero-purulent discharge. If, now and then, a complication with caries of the auditory passage or of the cavity of the tympanum exists, the above swelling is always smooth, solid, and limited to the posterior part of the auditory passage.

Prognosis.—Favourable in all cases of recent date, and the patient being in good general health; but very

unfavourable without these conditions, or in cases of carious complication.

Treatment.—Syringe daily with lukewarm water the discharging ear, and pour in, once or twice a day, a mild and lukewarm made solution of sulphate of zinc. Carious complications allow no particular active treatment.

c. *Inflammation of the Cellular Tissue.*

Diagnosis.—Violent, stinging, pungent pain in the ear, extending most commonly to the crown of the head and to the neck; at the very entrance of the auditory passage, one or two protuberant swellings, the size of a pea, very tense, but often quite colourless, extremely painful when pressed, and completely closing the auditory passage. There is very little or no morbid secretion at all, but a copious, sanguinolent, purulent matter appears when the inflammatory swelling opens, which is followed in all cases by instantaneous cessation of all pain.

Prognosis.—Very favourable.

Treatment.—Large, hot linseed-meal poultices uninterruptedly every half an hour, all day and night, applied to the ear, until the little abscess opens, or, if there are several, until all pain ceases. Leeches are quite useless. The abscess closes by itself within a few days, leaving no trace whatever.

d. *Inflammation of the Periosteum.*

Diagnosis.—Bad or rather sanious, ichorous discharge from the auditory passage, at the bottom of which caries is discovered by the introduction of a buttoned silver probe.

Prognosis.—Very unfavourable, as this caries is never cured but by exfoliation of the bone, followed by complete loss of hearing, and mostly by concretion of the dermoid layer, and complete closure of the auditory passage.

Treatment.—As long as the discharge continues, syringe daily the ear, and pour in a weak solution of sulphate of zinc, made lukewarm. Internally, anti-scrofulous remedies, but with little hope of any success.

3. *Diseases of the Membrane of the Drum.*

a. *Acute Inflammation.*

Diagnosis.—Extremely violent, tearing, suddenly appearing and permanent pain, at the bottom of one or very rarely of both ears, not often accompanied by fever, and soothed mostly by an early discharge of seroso-mucous matter. The whole length of the auditory passage looks quite healthy, save the ceruminous secretion, which ceases from the beginning of this inflammation, and reappears not before its complete cure. The membrane of the drum looks more or less pinkish, not transparent, not shining, evenly shaped, not concave, thickened; the handle of the malleus is invisible, and the slightest touch of the inflamed membrane exceedingly painful. Perforations are very frequent.

Prognosis.—Very favourable; perforations of the membrane of the drum close easily, and leave no scars.

Treatment.—The patient ought to be confined to a warm room, to live very quietly, and on the plainest

diet. The auditory passage is to be filled with lukewarm olive oil three times a day, and to be stopped with flax linen charpie (not with cotton wool); any discharge to be syringed or brushed away *very gently*. Two or four leeches are to be applied before and behind the ear again and again, till violent pains cease entirely. Perforations close as soon as all symptoms of inflammation of the membrane of the drum disappear. The use of any astringent solution, poured into the ear, is very seldom required.

b. *Chronic Inflammation.*

Diagnosis.—No fever, no pain, but a nasty, foul, yellowish, greenish, badly-smelling, frequently corrosive or sanguinolent discharge of one or both ears. The auditory passage looks quite healthy, but without any trace of ceruminous wax, for which crusts of dried up purulent matter are very often delusively taken. The membrane of the drum is always degenerated, without any trace of its natural structure, much thickened, not transparent, of the most variegated grey, yellow, or red hue, very often perforated, the size of a pin's head arising to its complete destruction. Not so often it is studded by polypous excrescences, which are either small and flat, or have long stalks, filling the auditory passage to its very entrance.

Prognosis.—Mostly unfavourable. The inflammation of the membrane of the drum, the discharge and the perforations, are the less curable, the more thickened and degenerated the membrane is. Polypous excrescences are removable under all circumstances. But all success in these respects is frequently not followed by a proportionate relief of deafness.

Treatment.—Topical remedies are the most beneficial

ones. Syringing the discharge of the ear daily, pouring in a solution of sulphate of zinc, made lukewarm, once or twice a day, and assisted in its good effect by rubbing a tartar-emetic ointment on a large spot behind and beneath the ear. Polypous excrescences are to be removed by scissors or knives especially constructed for this purpose, or by ligature, or by the application of a fine powder of nitrate of silver or of sulphate of zinc, by the aid of a zigzag-shaped and bluntly-pointed wire. Perforations admit of no particular treatment. Artificial membranes of the drum, and bits of cotton wool applied to the perforated and inflamed membrane of the drum, act on it as foreign bodies, prevent the cure of both its inflammation and perforation, and are to be rejected as injurious.

II. Diseases of the Middle Ear.

1. *Catarrhal Inflammation of the Lining Membrane of the Middle Ear.*

a. *Without all Exudation.*

Diagnosis. — The auditory passage and the membrane of the drum look quite healthy; deafness is considerably developed. Air blown into the Eustachian tube through my catheter No. 1, passes to the membrane of the drum quite easily, in a broad and uninterrupted current, with a sharp, dry sound, and followed immediately by increased deafness and fullness in the ear; if there was any noise before, it increases too.

Prognosis. — Very favourable in fresh cases, and inverse.

Treatment. — Topical remedies only are suitable. Blow a few drops of a solution of caustic potash (grs. ii. in ʒi. of distilled water), made lukewarm, into the cavity of the drum by the aid of catheter No. 1, to be repeated every fifth or seventh day. Sooner or later the normal sero-mucous exudation reappears on the surface of the lining membrane of the cavity of the tympanum. When this is the case, air blown into this cavity produces, instead of a sharp sound, mentioned above, a soft, slightly moist one, with more or less considerable relief of deafness, fullness and noise in the ear. This benefit is most likely derived from a favourable alteration in the structure of that part of the lining membrane of the cavity of the drum which covers the membrane of the fenestra rotunda.

b. *With abundant free Exudation.*

Diagnosis. — The auditory passage and the membrane of the drum present a very healthy appearance, not excepting the ceruminous secretion. Air blown through my catheters Nos. 1 and 2, into the Eustachian tube, does not pass to the cavity of the drum; but blown through the catheters No. 3 or 4, it passes up to the membrane of the drum in a long-continued, uninterrupted, broad stream, with a mucous rattling sound, and with very striking immediate relief of deafness (and noise, if there was any before). This relief changes into a complete cure, as soon as one succeeds in removing from the middle ear all mucous exudation, and in preventing its reappearance. At last, the air blown through catheter Nos. 2 and 1, into the Eustachian tube, reaches the membrane of the drum in an uninterrupted broad current, quite as easily as when these parts are in a healthy condition.

Prognosis. — Perfectly favourable, even in most inveterate cases, and in spite of any constitutional disorder, which may complicate the catarrhal inflammation of the middle ear.

Treatment.— Without losing any time by the previous cure of any constitutional complication, one blows, at intervals of several days, through catheter No. 4 or 3, *so strongly* into *the Eustachian* tube as to reach the membrane of the drum, and to remove all mucous rattling sound. Within a shorter or longer time this sound, which betrays free exudation in the middle ear, does not reappear any more; the faint current of air, blown through catheter No. 1, easily passes to the membrane of the drum, with complete recovery of the normal hearing, without being obliged to have recourse to any other remedy.

c. *With free and submucous Exudation.*

Diagnosis.— The auditory passage very often quite dry; the membrane of the drum not transparent, not shining, but dull, whitish. Air blown through catheter No. 1 or 2 into the Eustachian tube does not pass at all; when blown through catheter No. 3 or 4, it passes neither, except one makes an effort, aided by the patient's movement of swallowing. The air passes then in an *interrupted* current, or with a short, bubble-like noise, with a faint mucous sound, and followed by an immediate, but very moderate relief of deafness. It improves slowly by blowing out again, at more or less long intervals, the morbid mucous exudation, and by preventing thus at last its gathering in the middle ear. But then the improvement ends, owing to the not altered difficulty of blowing through the narrowed Eustachian tube. The narrowed spot

is easily discovered by introducing india-rubber bougies or catgut strings into the Eustachian tube, by the aid of my catheter No. 3. The mucous membrane of the throat is frequently dark-red and swollen.

Prognosis.—Is very favourable so far, as free exudation in the middle ear exists, but unfavourable so far, as submucous exudation in the middle ear contributes to deafness.

Treatment.—Free exudation in the middle ear is to be removed by the means, just described in the last article. Remaining strictures of the Eustachian tube, swelling and thickening of the lining membrane of the cavity of the drum, yield but very slowly to the application of small india-rubber bougies or catgut strings pushed forward beyond the stricture, and left there for a few seconds only. On this occasion all pain must be avoided most carefully, in order *not* to *increase the submucous exudation.* These mechanical means of treatment are applied alternately with the introduction of a few drops of a mild solution of sulphate of zinc, or of iodine, into the Eustachian tube, and, if open, into the cavity of the drum by the aid of my catheter No. 1, stopped at its funnel-like extremity by a cork. Add to these curative proceedings, mildly astringent gargles and the avoidance of all fatty and saccharine articles of food.

d. *With submucous Exudation only.*

Diagnosis.—The auditory passage is dry, now and then, as it were, scaling off, the membrane of the drum very frequently, though not always, opaque and white. Air blown into the Eustachian tube through catheter No. 3 or 4, passes hardly to the membrane of the drum in a more or less

faint and interrupted current, with a dull dead sound, and *without any relief*—nay, very often with a *striking increase of dullness* in the ear, which is, however, never permanent, but very often transient within a few minutes or hours. The stronger one blows into the middle ear, the more dullness and deafness increases, owing, most likely, to the mechanical action of a strong air-stream on the lining membrane of the fenestra rotunda, already irritated, swollen, and thickened. The more difficult the air blown into the Eustachian tube passes to the membrane of the drum, and the more dull the air sounds, the more swollen and thickened, the more deprived of all natural exudation, is the membrane lining the middle ear. The throat and soft palate look very frequently, but not always, swollen, not abounding in mucous secretion.

Prognosis.—Very unfavourable, because it is extremely difficult to reduce the swollen and thickened lining membrane of the middle ear to its normal structure, and to re-establish its natural sero-mucous exudation.

Treatment.—Submucous exudation of the middle ear is never benefited by constitutional remedies. Topical treatment only, applied to the middle ear with great caution and reserve, is suitable, but always with small benefit. India-rubber bougies or catgut strings of suitable calibre are to be introduced by the aid of catheter No. 3, through the strictures of the Eustachian tube to its tympanal opening, and to be left there not longer than half a minute. Never touch on this occasion the membrane of the drum, for such a contact is extremely painful, and rather injurious to the irritated lining membrane of the cavity of the drum. Alternately with these mechanical means of

extension, one blows into the Eustachian tube, and, if open, into the cavity of the drum, a few drops of a weak solution of sulphate of zinc, of nitrate of silver, or of iodine, at intervals of six or seven days, or still later, till the access of air to the cavity of the tympanum becomes free, and the natural exudation in this part of the ear reappears. Gargles benefit only very little; cauterisation of the throat still less; snuffs not at all.

2. *Noise in the Ear without Deafness.*

Diagnosis.—Permanent violent noise in one or both ears, which in all other respects are perfectly well and completely free of any objective organic alteration in their external and middle parts.

Prognosis.—Rather favourable.

Treatment.—A few drops of a solution of nitrate of strychnin (gr. j. to ʒi. of distilled water) are to be blown through the Eustachian tube, being completely open, into the cavity of the tympanum, in order to bring this remedy into contact with the chorda tympani, the true seat of all noises in the ear. Strychnin acts as a specific on the chorda tympani. The noise ceases very soon.

3. *Nervous Otalgia.*

Diagnosis.—Violent and permanent pain, deeply, in one or both ears, succeeding to or combined with violent toothache on the corresponding side; hearing quite normal, without any noise in the aching ear, and without any organic alteration in the external and middle ear.

Prognosis.—Very favourable.

Treatment.—Carious teeth, aching previously, or

still now, are to be drawn to make the otalgia cease altogether, and instantaneously.

III. Disease of the Internal Ear.

1. *Acute Inflammation of the Labyrinth.*

Diagnosis.—Violent and feverish pain, appearing suddenly in the depth of one ear, combined with cerebral symptoms of the most dangerous kind. The auditory passage is healthy; the membrane of the drum injured, lacerated; the cavity of the drum filled with blood and sero-purulent matter.

Prognosis.—Quite hopeless.

Treatment.—The most powerful antiphlogistic remedies did not yet prevent the fatal issue of such extremely rare cases.

2. *Chronic Inflammation of the Labyrinth.*

Diagnosis.—Inflammation of the *perforated* membrane of the drum, of old standing, is joined, more or less suddenly, by dull permanent pain in the ear, the bone of the temple, the mastoïd cells, and the back part of the head. This pain increases mostly by all motion of the head, chiefly by knocking with the knuckles against the just-mentioned bones, by driving over stones, &c. The perforated membrane of the drum and the lining membrane of the cavity of the tympanum are dark-red, swollen, very tender at the slightest touch; caries of the bone in the middle ear is discovered by the buttoned silver probe. Complete deafness, giddiness, drowsiness, some suppurative fever, paralysis of the corresponding side of the face, &c., precede death.

Prognosis.—Very dangerous, and most commonly fatal, by suppuration of the brain.

Treatment.—Leeches in great number repeatedly applied behind the ear till all pain subsides; very small pieces of ice, placed into a bladder, or into an india-rubber bag, kept all night and day on the back part of the head, and a strongly-acting tartar-emetic ointment with some drops of croton-oil, rubbed beneath and behind the ear, combined with saline purgatives or large doses of calomel; a very plain diet, absolute rest, high position of the head, in a cool room, &c., may save many a patient's life. The hearing is always gone for ever.

3. *Acute Inflammation of the Nerve of the Face.*

Diagnosis.—Violent pain in one or the other ear, and in the corresponding cheek; paralysis of its muscles and much fever appear rather suddenly. After several days' deafness and noise in the ear, headache, delirium, coma, &c., set in, and end fatally, unless an abscess is formed at the foramen stylo-mastoideum. The auditory passage and the membrane of the drum remain healthy almost to the end of the disease.

Prognosis.—Very dangerous, but not quite hopeless.

Treatment.—Leeches in large number behind the ear, and warm linseed-meal poultices applied to the same spot, in order to maturate and open as soon as possible the abscess, which comes forth in favourable cases.

4. *Nervous Deafness.*

Diagnosis.—Complete absence of organic alterations of the constituent parts of the external and middle ear,

to be ascertained by the most careful objective examination. Complete deafness. The true character of *primary affections* of the auditory nerve, enclosed in the labyrinth, and till now quite unknown by dissections, can, of course, still less be ascertained during lifetime.

Prognosis.—Quite hopeless.

Treatment. — All remedies hitherto employed to relieve nervous deafness (electricity, galvanism, moxas derivatives of all kinds, resorbents, &c.) were in vain, and ought to be rejected as rather injurious to general health.

Deaf and Dumb.

Diagnosis.—Inaptitude to learn to speak by intercourse only with speaking people, or not to forget the language, owing to complete, or a very high degree of deafness, inborn or acquired within the first six or seven years of childhood, *before learning to read.* Idiots are out of the question.

Prognosis.—Extremely hopeless.

Treatment.—If any considerable organic alteration of the constituent parts of the external or middle ears, being within the reach of the medical art, should be discovered as the real cause of the deafness of a deaf and dumb person, suitable treatment ought to be applied, according to the above directions.

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